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AIR WONDER STORIES

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Editor

SAN FRANCISCO

Science-Aviation Stories by
"BOB" OLSON
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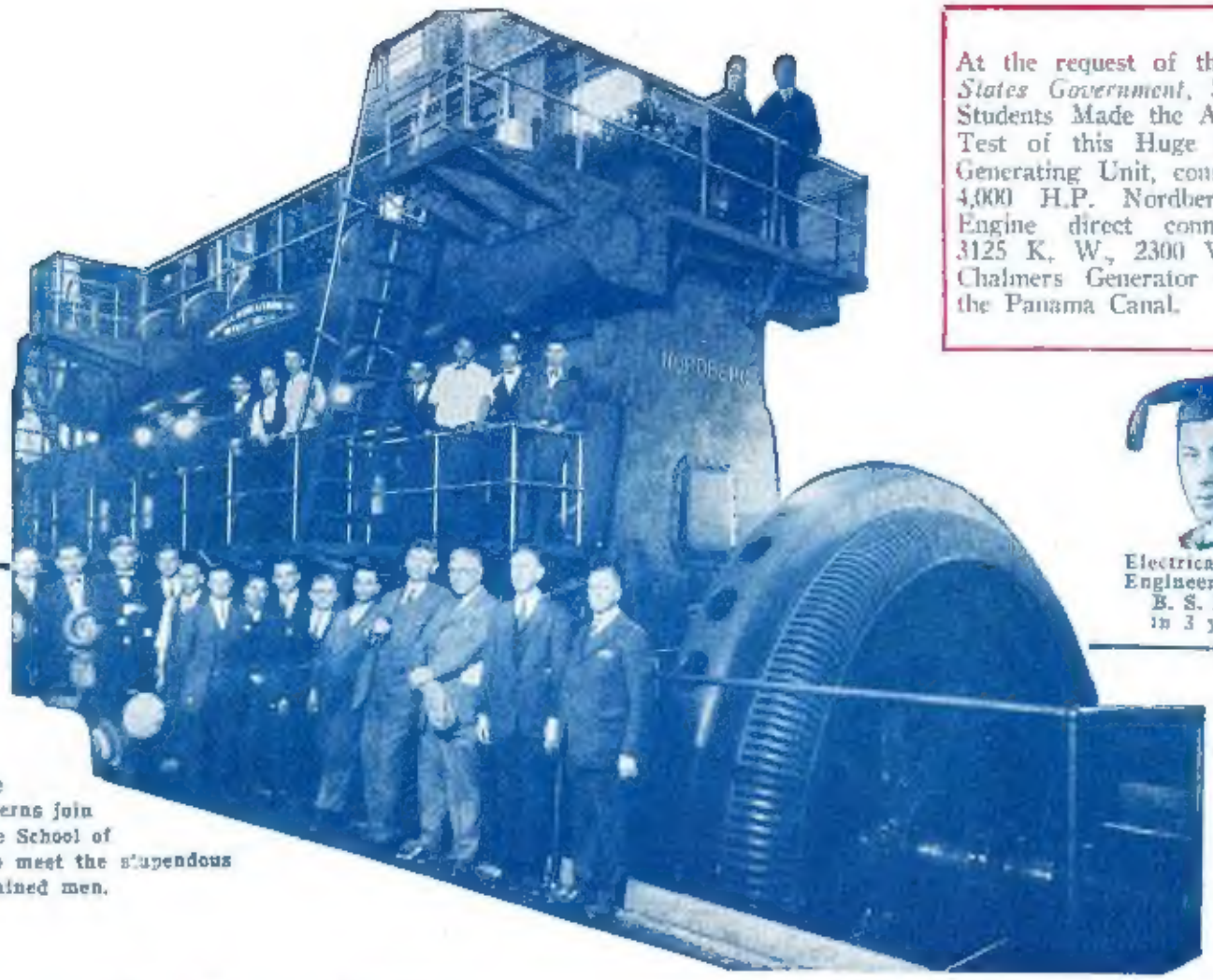

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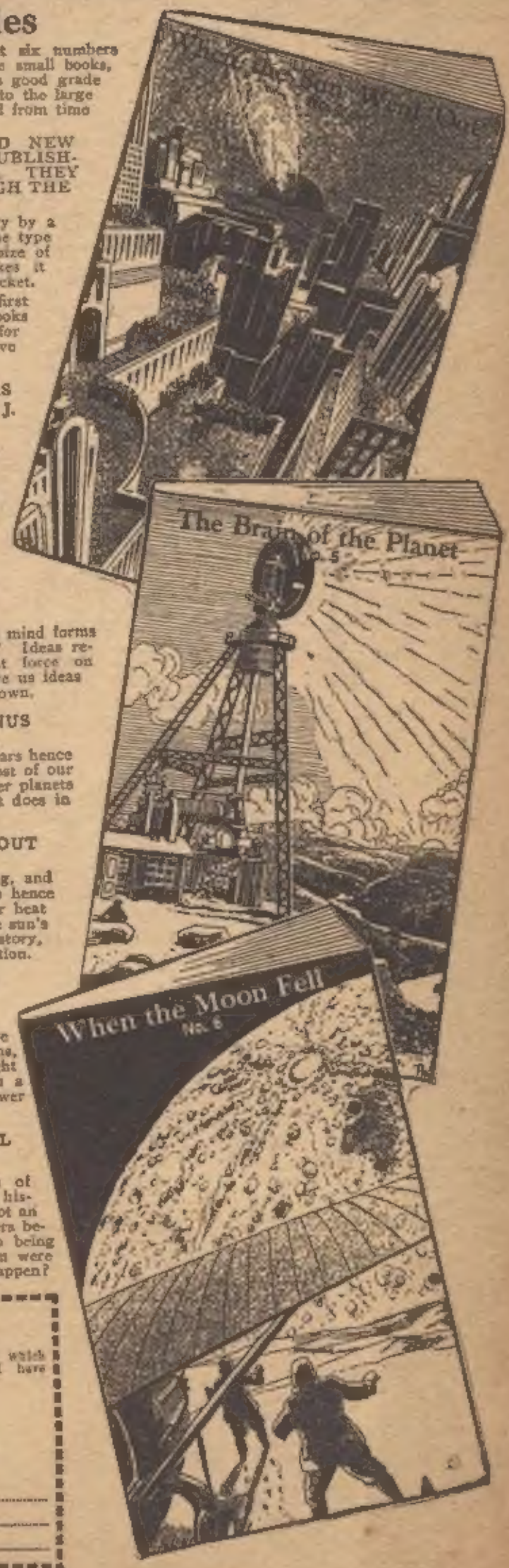

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On the Cover

this month is illustrated the story "FLIGHT IN 1999," by "Bob" Olsen. Here we see graphically one of the lofty air stations several thousand feet up in the air, kept aloft by the mysterious *Gravinal*. The huge flyer, just approaching the platform, stops to take on passengers, who have risen to the station from the city. The passengers themselves wear the future flying suits and are propelled by a *Gravinal*.

NEXT MONTH

THE INVISIBLE RAIDERS, by Ed Earl Repp. The World War has shown that invisibility is not impossible. It can be obtained in various manners, such as by camouflaging. Even now science has electrical or electro-mechanical means to make it possible for an aviator to change the entire color of an airplane for war purposes, so that it will merge with the sky. Thus, from a distance of a few thousand feet, it can no longer be seen. Pretty soon airplanes will be as noiseless as automobiles, and when that happens, they will become a terrible menace, particularly for war purposes. Don't fail to read this story where the author tackles and solves this problem in such an unusual way.

THE SKY MANIAC, by Henrik Dahl Juve. Of course, you remember "The Silent Destroyer" by this author, and now he has given us a sequel to his former story, which in all respects matches the first one, and in other respects, far eclipses it. For sheer daring and audacity of new scientific reasoning, this author stands alone.

THE AIR TUNNEL, by Harl Vincent. It is conceded by many that at low altitudes, say at 5,000 feet, it will be impossible to fly an airplane faster than about 750 miles an hour—if that fast. The air resistance becomes so tremendous at such speeds, that the power necessary to operate the aircraft makes the proposition uneconomic. Suppose that by some electrical means, it were possible to create a vacuum in which the airplane of the future will fly. This is not an impossible thought, and you may rest assured that this will come to pass. The author proposes an entirely new scientific thought in this story that is revolutionary. It is one of the biggest ideas that has ever been proposed for aviation. You simply must read this story.

AROUND THE WORLD IN 24 HOURS, by R. H. Romans. In introducing this new author to our ever-growing audience, we are certain that they will applaud the new aviation thoughts embodied in this story. Based upon excellent science, his plane which travels 24,000 miles in 24 hours, or 1,000 miles an hour, is neither preposterous nor impossible. Young men now living will ride in such planes.

AND OTHERS.

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VOLUME 1
No. 3

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The Future of Aviation Springs from the Imagination

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These aeronautical experts pass upon the scientific principles of all stories

ROCKET FLYING

By HUGO GERNSBACK

THE next great development in the art of aviation will no doubt be the "rocket flier." Every aviator knows the limitations of the gasoline engine, the disadvantages of the electric ignition system and the often unreliable propeller.

The weight of the gasoline engine, with its ignition apparatus, fuel, and of the propeller system, usually is as much as that of the rest of the airplane; and for that reason engineers for a long time have been trying to evolve something better.

It is true that experiments are now being made, in all countries, to replace the present gasoline engine by means of the Diesel engine—which requires no electric ignition system, neither does it use gasoline; the fuel in this case is crude oil. While combustion does take place, the firing is not done by electrical means; the oil becomes ignited because of the high compression that the Diesel engine causes. While this is an advantage, and does away with the often-unreliable electrical ignition system, the developments of Diesel engines for airplanes so far have not been very encouraging. The walls of the cylinders for the Diesel engine must be so thick, in order to withstand the tremendous pressure, that not much saving of weight is possible.

The next great development, undoubtedly, lies in the proposed rocket airplane, on which extensive experiments are now under way, particularly in Germany. The rocket apparatus, compared to the gasoline engine, is a marvel of simplicity; there are no moving parts, and the weight of the "engine" is small, because it consists only of tubes. As the name implies, the rocket device is nothing more or less than a powerful rocket. The firing is usually done by means of a simple electrical apparatus, and chemical means could be devised if necessary.

The rocket principle is totally different from any other form of propulsion; and any one who has ever seen a firework rocket go into the air will understand that the rocket does not rely upon propellers or engines. Rather, the underlying principle is motion imparted to the rocket by reaction to the expulsion of highly-compressed gases. It is a mistaken notion of some laymen to suppose that a rocket works well only in the atmosphere—the reverse is true. The efficiency of the rocket is much better in a vacuum, as demonstrated by the experiments of the American physicist, Goddard, of "rocket-principle" fame.

Recently, in Germany, experiments in rocket propulsion were made by Max Valier, who attached a number of electrically-fired rockets to an automobile. The speed obtained from this automobile was greater than that of any vehicle that traveled on rails before. The automobile in this experiment did not run on a dirt track, but on steel rails, and there were no human beings inside the car; the only occupant being a cat. Such excessive speed was developed that the rocket automobile jumped the track and wrecked itself, incidentally killing the cat.

Of course, at present, the rocket principle as applied to airplanes, is still in the early experimental stage. No airplane has been built with rocket propulsion, the reason being mainly that no very satisfactory rocket fuel has been developed. The present fuel consists almost entirely of black powder which, when ignited, burns very rapidly and gives a tremendous "kick," tending to move the rocket in the direction opposite to the motion of the exhaust gases.

Engineers have become satisfied that rocket propulsion will form the basis of the airplane motor of the future. It will not be long until a suitable and efficient fuel will be forthcoming. Among one of the rocket fuels mentioned lately by German engineers is liquid oxygen, the efficiency of which seems to be very much higher than that of ordinary black powder.

Fuels such as dynamite, nitro-glycerine, have also been mentioned in the past; but, so far, no means has been found to make them safe and to control the explosions in a desired degree.

This, however, need not frighten us; because, only 40 years ago, if some one had mentioned that you could ride in a car that relied for its power upon gasoline that continuously exploded, you would have been most dubious about the sanity of any inventor proposing such a scheme. Yet the automobile is a witness that the explosive engine has been, in its way, a success.

Of course, once a suitable and powerful rocket fuel has been developed (as it probably will be within the next twenty-five years) the problems of controlling the explosions from the different rockets to a nicety will be easily solved by rocket-propulsion engineers. Strange as it may seem, it will then be possible to have an airplane that can hover about, and practically stand still, simply by firing the rocket engines at the desired rate. It will thus just balance the force of gravity; exactly as a motorist to-day can hold his car stationary on a hill by letting his engine run, and just getting enough power from the engine to neutralize the force which tends to pull the car down the hill.

THE AIRPLANE OF THE FUTURE

By HUGO GERNSBACK

Member American Physical Society
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IN contemplating the future, commercial, heavier-than-air machine along strictly engineering lines, we should be guided by the past history of other endeavors in transportation. The development of the steamship and of the automobile shows us the way. When we compare the first steamboat built by Robert Fulton and place it side by side with the *Leviathan*, we are astonished at the tremendous progress made. There is a similar comparison between the first automobile and the modern auto bus, and the same is true of the first locomotive as compared to the present-day monsters.

History will repeat itself in the same manner in airplane construction. The planes which we have to-day will be considered very small and inefficient, as in the light of the planes which we will have fifteen or twenty years hence.

In the illustration accompanying this article, I have endeavored to show some of the possible improvements based strictly upon aviation engineering principles, as they no doubt will come about very soon. For some of the suggestions embodied in this article, I am indebted to General William Mitchell, former director Military Aeronautics, U. S. Army.

The plane illustrated is all-metal and has a wingspread of about 250 to 300 feet; its total length from propeller to tail is some 250 feet. The machine will probably weigh in the neighborhood of 1,000 tons, or slightly over. Accommodations for passengers will be contained entirely inside the metallic wings, as shown in the illustration.

In order to do away with air friction, so far as possible, the landing wheels are retracted into the body of the machine, the instant the airplane leaves the ground. When a landing is to be made, the wheels are lowered into landing position.

One of the greatest dangers, at the present time, in flying at considerable heights and particularly in flying over the oceans, is from ice forming on the wings and propeller. This has been the reason for many accidents and many planes have disappeared into the ocean, because of ice formations.

A way to overcome this rather easily is shown in the illustration—the use of electric heaters installed within the wings. The metallic wings can quickly be heated sufficiently to melt the forming ice, after which the electric current can be turned off.

The writer proposes a novel scheme to keep off the dangerous ice from the propeller. The 30-foot all-metal propeller contains within itself tubing, into which the exhaust from the engine can be directed whenever it becomes necessary. This will heat the propeller sufficiently to keep ice from forming. During normal conditions the exhaust can, of course, be diverted in the usual manner.

The illustration shows also a large gyroscope for stabilizing the airplane. This becomes necessary in all choppy weather, and tends to keep the airplane on an even keel. Its use also becomes important when flying in a fog and will prevent the navigators from losing their orientation.

But, for safety purposes, the most important element of the airplane of the future, is the multiple power plant. To the writer's mind, the multi-propeller airplane of the present day will not survive in the future. The reason is that neither much safety nor anything else is gained by installing separate power plants with separate propellers, for too much additional weight is necessitated thereby.

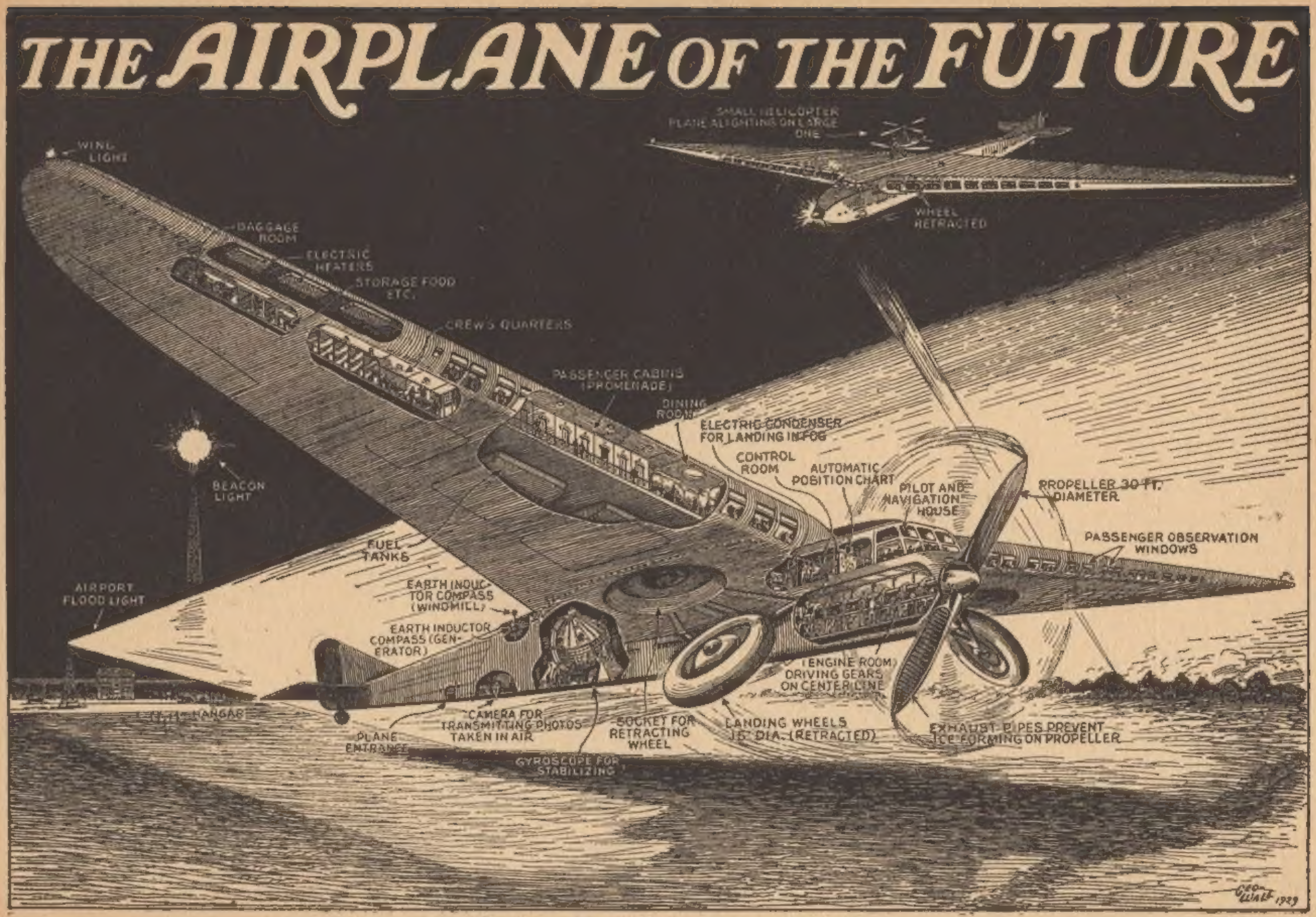
In the illustration is shown a simple remedy; and that is to use a single propeller attached to a single shaft, to which shaft are coupled a number of separate engines. All these engines operate individually and, let us say, there are six engines; two or more of them can go dead, while the others will still give sufficient power to keep the plane aloft.

Normally, three engines are used, while three are kept in reserve. Repairs can be made on any three engines by the mechanics, while the machine is in flight, without slowing down the airplane. The engines, as will be seen from the illustration, are accessible from all sides and are, of course, also enclosed in the inside of the lower part of the airplane.

By the time this airplane will be built, there will be many new devices in use, such as the already-developed electric-condenser apparatus for landing in a fog. This arrangement, by which a plane itself becomes one plate of the condenser, while the earth is the other plate, accurately registers upon an instrument in the navigation house the distances of the machine from the ground. This, of course, is important while flying in a fog. No doubt the airplane of the future will be equipped with huge neon parabolic lights in order to pierce the fog.

Planes such as that pictured here will be constructed to cover great distances. Such planes will make trips from Los Angeles to New York without stopping; while passengers may be taken off or on by small helicopter planes alighting on the back of the large machine as pictured in the illustration.

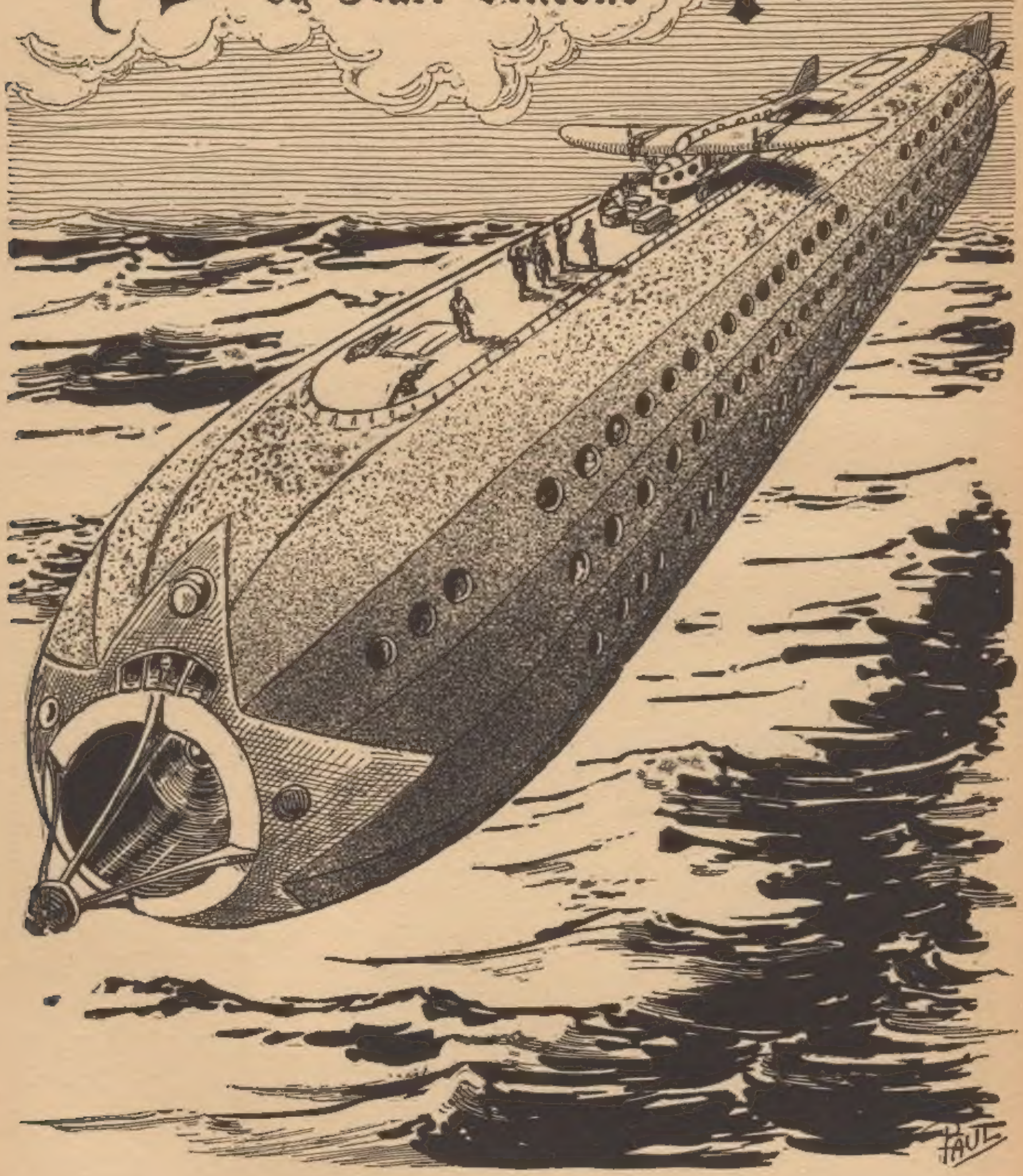
THE AIRPLANE OF THE FUTURE



(Gyroscope—Courtesy Sperry Gyroscope Company)

The Yellow Air-Peril

by Harl Vincent



At a word from the leader they loaded the cases into the rear of the plane. All hatches atop the *Albatross* had been fastened and now there came loud thumpings and shouts from beneath one of these.

INTO the most uneventful life there sometimes comes a supreme adventure, an experience of such breath-taking interest that it fully compensates for all the drabness that has gone before. To Roger Erskine, in his mid-thirties, it seemed that there was nothing that could happen to alter the humdrum routine of his existence. But in this he reckoned without the powerful hand of that intangible mistress of our destinies we call Fate.

Morning after morning, for more than twelve years, he had passed through the ornate entrance of the New York-Paris Airways Building at precisely five minutes before nine o'clock. True, his advancement with the great transatlantic airline had been steady and remunerative. Now in the position of vice-president of engineering, his yearly salary ran close to six figures and his power and influence in the organization had become almost supreme. But he was far from contented.

Since the death of his father in 1941, Erskine had spent five lonesome years, though he maintained the Park Avenue apartment they had occupied together. Deeply immersed in his work, he had little time in which to meditate on this lonesomeness or to cultivate outside acquaintances. It was thus that he found time hanging heavily on his hands when his objective had been reached and the more arduous of his duties shifted to the shoulders of a staff of capable subordinates.

HARL VINCENT

The New York-Paris Airways, Incorporated, in addition to the regular operation of its lines, engaged in the manufacture and sale of the huge air-liners used in transoceanic travel. It was in this branch of the activities of his corporation that Erskine specialized for years, but now his duties extended to the maintenance and repair of all mechanisms on board the many liners in regular service as well as to the supervision of design and manufacturing. But in this executive capacity he found, somehow, a lack of the intense interest that had been his urge during the years of struggle to reach the top of his chosen profession. And now, less than a month after being installed in his new position, he was inclined to consider the suggestion of John Emory, Chairman of the Board, that a half year in Europe would benefit him greatly and serve as a fitting preliminary to the actual taking over of his new responsibilities.

"Roger," his father's old friend and adviser had warned him, "you have been working very hard ever since you left college and have enjoyed no recreations to speak of, nor have you ever taken a vacation. You will become an old man before your time and will go stale on the job. The company owes it to you and I want you to pack up your duds and play around Europe for awhile—say for six months at least."

Roger had been taken off his feet by the suggestion. "But, Mr. Emory," he objected, "I'm no good for that sort of thing. I must keep in the harness or I don't know what to do with myself."

"Suit yourself," the chairman had replied, "but don't forget what I have told you. And if at any time you should change your mind you have full authority to go ahead, and at the company's expense."

These words came back to Roger now and he drummed the glass top of his large mahogany desk with nervous fingers as he gazed abstractedly through the open window of his office.

"Is that all, Mr. Erskine?" inquired the soft voice of his secretary.

"Oh, I beg pardon, Miss Henderson," he apologized, with a sheepish laugh, "with my day dreaming again I completely forgot what we were doing. Let me see now—where were we?"

The efficient secretary soon set him straight and the work continued to the end. But his interest had deserted him completely when they had finished. It was mid-April and Spring was in the air.

"By George!" he exclaimed with sudden decision, when little Miss Henderson had tripped from the room. "I'm going to make that trip. Paris - Vienna - Rome - Barcelona - the Riviera! And, I might as well start now before I get too deeply into this new job."

He thumped his desk vigorously. And that decision marked the beginning of adventure for Roger Erskine.

The Albatross

FORTY-EIGHT hours later the *Albatross*, one of the fast N.Y.P.A. liners, tugged at her mooring mast like a spirited hound at the leash. It lacked a half hour of noon, her scheduled sailing time, and Roger gazed with pardonable pride at the silvery length of the dirigible that swung majestically above her Long Island landing field, nose cuddled to the mast yet straining to be away. These giant ships were children of his brain—he loved them like children,—knowing their every caprice, their faults as well as their virtues.

At the foot of the mast he was saluted by Captain Anderson.

"Glad to see you, Mr. Erskine," said the captain heartily. "And glad you're crossing with us. Just saw your name on the passenger list this morning."

Roger grinned delightedly. He had known Anderson for a number of years and admired him greatly.

"Thanks, Cap," he replied. "Glad to see you too. Much of a passenger list?"

"No. Less than seven

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And his science is good! This, however, is not surprising, because the author has been an engineer to one of our well-known electrical industrial corporations. As such, he has the necessary experience to know whereof he writes and he never permits himself to go into the realms of the purely fantastic.

hundred this trip. But there's some notables aboard."

"Yes?"

"You bet. Half a dozen bank presidents and millionaires, not to mention a couple of congressmen and old Baron von Hofe and his new chorus-girl wife. Then besides, there's Professor Ingalls and his daughter."

"Ingalls?" exclaimed Roger. "Oh, that's great. I've wanted for a long while to meet him."

"I'll fix that as soon as we sail. Both of you are assigned to my table, so it will be easy. But there's something mysterious about Ingalls' mission abroad. The reporters and cameramen have been hanging around the field all morning trying to get some dope on him, but he won't leave his cabin."

Roger laughed. "That's typical of him, from what I've heard," he commented. "He must be quite a character."

"He sure is. You'll be surprised when you meet him. Funny old duck, but has a way of looking at you that makes you feel like a low-grade moron."

Last-minute arrivals were crowding into the lift and Roger and the captain joined these in the swift ascent to the waiting vessel. When they emerged from the cage and entered the passageway of the *Albatross,* Captain Anderson pulled Roger aside while the other passengers filed past on their way to the cabins on the four decks of the vessel.

"Come to the bridge with me," he whispered, "I'd like to show you how easily she handles with the new controls that have just been installed."

Willingly, Roger followed and soon found himself in the midst of the central bridge-control mechanisms with which he was so familiar. The helmsman was already at the wheel and through the open windows swept the warm breeze from the ocean. Before them, curving sharply upward, there was the glistening lower surface of the great metal cigar in which was safely imprisoned the gas that provided their buoyancy. To the field, nearly three hundred feet below, stretched the latticework of the mooring mast, swaying gently with the movements of the giant liner tugging at its tip.

There came the long blast of a siren from below—an answering blast from the *Albatross*—the clang of unloosed shackles forward. Slowly the mooring mast seemed to drift away from the nose of the huge silvery cigar, slowly the landing field rotated beneath them as the seemingly motionless ship was carried from its mooring by the playful breezes. Then, at a touch of Anderson's finger, there came the throb of the twelve motors and Roger knew that a gale of wind was blowing aft through the thousand-foot tunnel which perforated the axis of the huge cigar—a gale that created the partial vacuum forward into which they would be drawn with ever-increasing velocity. The ship responded to the wheel and they quickly headed across the wind and sped high above the dotted countryside of Long Island toward the Sound.

Anderson turned to Roger with a smile. "Pretty?" he asked.

"Perfect. But how does the chief like it?"

"Oh, the engineers are all right. They kicked a bit at first but this bridge control's got it all over the old telegraph system, and they soon got wise to the fact that it saved work for them too."

"That's good. At first we feared there would be trouble. But it seems to be working out fine on all the ships."

"Sure. No reason it shouldn't And now, let's get below and wash up a bit. I'll show you to your cabin."

They crossed the promenade on their way to the lower deck and Roger thrilled with a sense of freedom and something of anticipation as he noted that the fishing boats off Port Jefferson were slipping rapidly astern far beneath them.

CHAPTER II
Professor Ingalls

TO the eye of the casual observer, the figure of Professor Warren Ingalls presented little to attract the attention. Small of stature, with bandied legs encased in trousers several sizes too large, his gait was that of a slouching chimpanzee. He stooped badly and his totally bald head hung from his shoulders at such an angle that one was impelled to look for his eyes in the vastness of that incredibly pink and shining pate. And when he raised his head and peered from beneath his bushy russet brows, the object of his gaze, if of human mould, was quite likely to quail beneath the piercing, contemptuous fire that snapped from the most remarkable pair of blue-black eyes in existence. But when he spoke, the soft gentility of his voice belied the warning of those eyes, while the authority of the words issuing from the slightly twisted lips brought instant attention.

Roger Erskine was thrilled when he found his place at the captain's table immediately adjacent to that of the great scientist. He was slightly flustered at the disconcerting stare from those remarkable eyes when the professor gravely acknowledged the captain's introduction of him, but his embarrassment heightened to near panic when he was presented to the beautiful girl at the professor's other hand. She was his daughter! And the most strikingly lovely girl Roger had ever seen. The hard-working young engineer had always shunned the fair sex and he now found himself utterly speechless in the presence of one of its fairest representatives. But the next words of the professor set him somewhat more at ease.

"Are you the Erskine of N.Y.P.A.?" he asked.

"I am, Professor."

"Rather young for the position of responsibility you recently acquired, aren't you?" The black eyes twinkled with the question.

"Why—possibly. By ordinary standards. But you see I have spent twelve years with the organization—grew up with it, in fact."

"Hm. Twelve years. Then you don't consider your advancement as anything out of the ordinary?"

"No sir. That is, not particularly. In commercial aviation most of us are youngsters, you know."

"That's true," sighed the professor wistfully. "However, some of us older fellows have given it many a boost, too."

"Indeed yes," replied Roger, thinking of the twelve oil engines of the *Albatross* whose high thermal efficiency was made possible by one of Ingalls' inventions.

"And do you know," the professor's voice continued in a soft whisper, "I have the most astounding improvement of all worked out at the present moment?"

"You have?" asked Roger, excitedly. "What is it?"

Ingalls looked furtively around the table. "After dinner," he whispered, "come to my suite and I'll tell you all about it. Possibly you can help me too. The thing is so far reaching that dangerous alien fingers are already stretched forth to steal it from me. Spies are everywhere."

Roger looked incredulous but he could not doubt the sincerity of the professor's fear. The savant's bright eyes had dulled with a glaze of positive terror.

"I'll come, professor," he said gravely, "and thank you for the invitation."

The silvery voice of Irene Ingalls proved a welcome relief.

"Father," she reproved, "you're not talking shop with Mr. Erskine, are you?"

The professor looked up guiltily. "I'm afraid I was, my dear," he admitted.

"Well, you must stop it at once," she pouted prettily. And the smile she flashed at Roger caused his heart to skip a beat.

From there the talk shifted into lighter channels and Roger found himself enjoying immensely the company of the professor and his charming daughter. By the time the meal was finished he had completely forgotten the engagement with the father and when the three strolled from the dining room he proposed a turn about the promenade deck.

They were about two hours out now and were flying low over Cape Cod Bay, approaching Provincetown. There was scarcely a breeze and the deck was as steady beneath their feet as the solid ground. The drone of the motors came pleasantly to their ears and the light of the sun reflected from the calm waters below in dancing diamond points of dazzling brilliance. It was a peaceful and beautiful day and it seemed that most of the passengers were on the promenade deck.

The professor seemed lost in thought, rarely interrupting the conversation carried on so fluently now by his daughter and Roger. He displayed little interest in their talk and appeared nervous and irritable. Once, when they passed a seated group of men, he hesitated and peered intently at one whose eyes were hidden behind a pair of large, black-lensed goggles.

There was a little flurry amongst the passengers on the port side and a group gathered about one of the large observation windows. When they joined this group they found them watching the maneuverings of a large cabin plane that circled and banked in close proximity to the *Albatross*. It was a speedy monoplane and the roar of its single radial motor drowned completely the purr of their own engines. Again and again it circled, banking steeply as it drew closer to the great liner. Then the pilot cut his gun and glided swiftly toward them. It seemed that he must crash into the very window through which they watched spellbound. Then he dove sharply and cut underneath, out of sight. But in the brief instant of passing, the plane had approached so closely that they plainly saw a figure in one of the windows signalling with a handkerchief.

Roger turned quickly at the sudden grip of a strong hand on his arm. It was the professor and he pointed with his free hand to a crouching figure at an adjacent window.

"Look!" he said hoarsely.

The crouching man sprang from his position and ran with cat-like agility for the nearest companionway, tucking a white handkerchief into his pocket as he turned. Roger did not get a good look at his features but from the fleeting glimpse he did obtain he felt sure that the man's countenance was of decided Oriental cast.

"He signalled the plane!" breathed the professor in explanation.

"What does it mean?" asked Roger, puzzled.

Irene Ingalls stood by, suddenly white-faced. The passengers talked excitedly of the "stunting" they had just witnessed.

"It means," said the professor solemnly, "that the enemy is on my trail. We must advise the captain at once. And then, my boy, I'd like to have that talk with you."

A Capture

CAPTAIN ANDERSON listened gravely to the professor's account of the happenings of the afternoon.

"Funny, Professor," he said, "I thought you were mighty secretive about this trip and mighty anxious to get away without being seen. But I had no idea you were trying to avoid some danger. Is it a question of evading a gang of racketeers or commercial spies who are after this invention of yours?"

"Worse than that, Captain. A great government is after the secret—a government that has been waiting, watching, planning for years—a government that would plunge the world into a war of far greater magnitude than the war of 1914-1918, a war that might well mean the end of civilization."

Anderson sat aghast at the professor's earnestness, as did Roger. But Irene seemed not to be surprised—she was evidently in her father's confidence.

"Chinks, did you say they are?" asked the captain.

"Not exactly," replied the professor, "though many of the enemy are of the yellow race. The government I speak of is a secret religious government that plans dominance of the world, and with my discovery in their hands—with the discoverer removed—this would prove a simple matter. This is a religious organization that has sprung up unsuspected during the past fifteen years."

"Religious?" asked Roger, blankly.

"Exactly. I chanced upon the headquarters of their organization more than five years ago when I made that trip into Mongolia and they have followed me and spied on me ever since."

"But," objected the captain, "these heathens couldn't hope to carry out such a plan. They haven't the money, the intelligence, nor the man power."

"Man power!" exclaimed the professor. "Why man alive, don't you know that more than thirty per cent. of the population of the world are of the yellow race. Don't you know—?"

But his sentence remained unfinished, for Captain Anderson hurled himself from his chair and sprang past the professor so suddenly as to knock him breathless into his chair. Roger turned in alarm at sound of a heavy impact and a smothered shriek behind him. Anderson had plunged through the open door and now held in his great hairy paws a struggling, slant-eyed individual who snarled and fought like a wild cat. The captain flung his captive to the floor and bolted the door behind him. Irene drew back in distaste.

"Got him!" grunted the captain delightedly.

An hour of vigorous questioning failed to elicit any information from the prisoner. Not even with third degree methods, of such severity as to bring forth the disapproval of Roger and the professor, was the captain able to learn anything regarding the confederates nor the mission of the inscrutable yellow man. Finally he gave up in disgust and ordered the defiant spy carried below in irons.

Irene had long since left the captain's quarters and Roger soon followed the professor to B deck and down a corridor to his suite. Irene looked up from a novel

when they entered. She smiled—a bit wanly, Roger thought.

"Did the captain learn anything?" she asked.

"Nothing," said her father, spreading his hands in a gesture of futility. "It is always this way. The authorities seem unable to help us—they are absolutely powerless against this organization. When one member is apprehended another takes his place. They have followed us—even here."

"There are more of them on board?" The girl paled perceptibly.

"Undoubtedly. And all of my paraphernalia—my entire secret is right here. They are preparing a desperate effort to obtain it all at one stroke."

He pointed at several large iron-bound trunks that occupied a corner of the large sitting room of the suite. Then he turned to Roger, speaking rapidly.

"The secret that would give them control of the world, nay of the universe, is in those innocent appearing cases. Fool that I was to think that I could escape them—fool not to have placed my apparatus and my daughter under the protection of our government at home instead of starting on this hare-brained attempt to hide in Europe!"

"But the secret, Professor?" Roger asked, fired by the man's intense conviction, "I do not understand."

"Excuse me, my boy," apologized the energetic little man, mopping his brow. "Please have a seat and I'll explain it all to you right now. Here—a cigar."

The Professor's Secret

HE handed a long black stogie to Roger and sank into a chair opposite the one he had indicated to his guest.

"Perhaps you consider me a madman," he began. "In fact I was in doubt as to my own sanity when I first stumbled on the discovery these fiends are after. But it is all there—in those cases——indisputable proof that I can duplicate at any time. The secret of the universe is there—all the dreams of the ancient alchemists come true—the transmutation of elements—the annihilation of energy—all are now possible."

"You mean—you mean you have learned how to disintegrate the atom?"

"Precisely. Listen—the *Albatross* carries twelve engines of two thousand horsepower capacity. For all their high efficiency, they consume four-tenths of a pound of low-grade oil per hour for each horsepower they turn out. Nearly one hundred and seventy-five tons of fuel are thus needed to complete the thirty-six-hour journey from New York to Paris. The engines themselves, for all their superior design, weigh considerably more than a pound per horsepower rating—another fifteen tons. Think of the pay-load sacrificed! With atomic motors of less than a tenth of the weight of your modified Diesels and with no fuel weight whatsoever, the journey could be made in less time and at a cost of not more than ten dollars an hour for power—a total fuel cost less than that of a single first-class passage. By a simple adaptation of my process, nitrogen extracted from the atmosphere as we progress could be used as fuel in the atomic motors, the destruction of its atoms in especially constructed chambers providing the nearly free energy."

Roger stared agape. "But, can this be definitely controlled?" he asked.

"Absolutely. And, the derivation of power is but one of the uses to which my discovery can be put. That is where the danger lies, if it falls into unscrupulous hands. The energy can be controlled from a distance. Battleships, airplanes, whole cities could be wiped out of existence in the twinkling of an eye and at the simple pressure of a button. Millikan's cosmic rays are the basis of the secret."

"Cosmic rays?"

"Yes. That is, the results are accomplished by selecting them and, after sorting and redirecting them, putting them to work. To fully understand you must fix firmly in your mind the postulate that nothing exists excepting energy. There is no ultimate solidity or substance to anything. The earth, man, light, heat, electricity, are composed of the same thing. The universe consists of emptiness, charged with electrical energy. And matter, as we know it, is forever changing form, forever shifting its tiny charges of energy and evolving itself into another form, though the process is generally so slow as to be imperceptible. Out in the near-vacuum of interstellar space there are tremendous energy reactions that give birth to atoms and thereby produce the cosmic rays, which are the most penetrating and powerful known to science. The rays are produced in several forms, in fact in as many as eighty forms, each dependent on the birth of a particular type of atom. One is generated when atoms of helium gas suddenly organize themselves out of the electrons and protons that wander through space, others accompany the birth of silicon, hydrogen or caesium atoms and so on. Each ray has an identity and a use of its own when brought under control and of course I have so far only skimmed the surface—there are but seven types I have identified and controlled.

"My first inkling of the tremendous possibilities in the way of utilizing the rays came during that Mongolian trip. My party was in the Khangai mountains and we had sunk an electroscope to a level 250 feet below the surface of a small lake known as Zagan Nor. The rays registered powerfully and came through in different spectroscopic bands answering to the syntheses of certain of the elements. This set me thinking and I soon isolated the ray corresponding to the element hydrogen, whose atom is simplest of all. I endeavored to determine the reaction of the ray by placing in its path a minute quantity of hydrogen, sealed in a small capsule. Nothing happened at first and I experimented with collecting and redirecting a great volume of these particular rays, all of which concentrated on the tiny capsule of hydrogen. I stepped from the field laboratory to call an assistant and thereby saved my own life, for I had no sooner closed the door when there was a terrific explosion within and the shack was blasted to smithereens with a roar that knocked me flat and bruised my body severely.

"That was the beginning. You see, for every action there is an equal and opposite reaction and I had obtained the reaction equal to the birth of a definite number of hydrogen atoms far off in space. Energy—it is everywhere. And to it alone we owe our existence. Unfortunately the following experiments were watched by a number of the native members of my party and of course they reported to what I later learned was the headquarters of this secret religious council. Thanks to them our existence is now threatened by the danger of my energy-control discovery getting into their hands."

Roger gasped. "It seems impossible, Professor," he said. "But I have not the slightest doubt of your words. And you say elements have actually been transmuted in this manner?"

"Yes. I have taken uranium, the heaviest element in the atomic scale, and from it have produced successively lead, by removing ten protons from its nucleus, gold, by removing thirteen, and hydrogen, by removing ninety-one. All elements can be transmuted into others by a similar process."

"Then these Mongolians would be able to provide themselves with anything they need to make war on the rest of the world?"

"Easily. But don't misunderstand me as to who these enemies are. This is a Yellow Peril we are facing, because the central stronghold of the enemy is among the yellow races. The war would probably represent a struggle with about sixty per cent. of the yellow race aligned with forty per cent. of the white race against the remaining sixty per cent. of the white race and forty of the yellow. It is to be entirely a religious war. You see, the Buddhists now include the Confucianists, the Taoists, and the Shintoists. They have a foothold in all countries and among all races, though most powerful in the Orient. They—"

The professor stopped short in his discourse, for at that moment the lights flickered, then went out, leaving them in almost total darkness. The doors to the sleeping rooms were closed and the sole illumination came from the narrow rays of light from the portholes that filtered underneath.

Irene stifled a scream.

Then Roger experienced a tingling of the scalp. His hair seemed to be rising on end for, on the opposite wall, there appeared as if by magic a squat, pot-bellied, smiling Buddha, wreathed in eerie green luminescence.

CHAPTER III
A Daring Robbery

WHEN the lights reappeared as suddenly as they had been cut off, the three occupants of the room stared at one another in wonder.

"What kind of tomfoolery is this?" exploded Roger.

But the professor merely stared and stared at the corner of the room. His eyes seemed to bulge from their sockets.

The iron-bound cases containing his apparatus were gone!

Irene rubbed her eyes in startled amazement. "Why daddy," she exclaimed, "the trunks have disappeared. How do you suppose they did that?"

Her father's eyes dulled hopelessly and he shrugged his shoulders resignedly. "It is beyond me, dear," he replied, "but they're gone and I guess that is the end of it."

"But," objected Roger, "there's nothing supernatural about this, Professor. They've stolen them by entering this room through a trapdoor or a sliding panel or something. Let's get the captain and investigate. Surely your personal property can be recovered—it is still on board this vessel."

"You do not appreciate the cleverness of the enemy, my boy. But your suggestion is a good one. I shall call the captain."

A thorough search directed by the captain and his first officer revealed no clue as to the means used in removing the missing cases from the room. Careful soundings of the walls, floor and ceiling and examination of the joints of these partitions showed not the slightest evidence of their having been disturbed.

"Well," said Anderson, finally giving it up as a bad job, "it certainly seems that some means other than physical were resorted to in removing the precious trunks. But I'll have every cabin on board searched this evening. Meanwhile we should be dressing for dinner."

"What!" exclaimed Rogers. "It's not nearing dinner time!"

"Surely," said the captain, consulting his watch, "it lacks but fourteen minutes of the hour."

"But—but," the professor stammered, "that is impossible. We spent not more than an hour on the promenade and can have been here no more than an hour since we left your quarters, Captain."

"It is fully three hours since you left my cabin, Professor."

The captain frowned in perplexity while Roger and his new found friends stared at one another in wonder.

"I have it!" suddenly exclaimed the professor. "That Buddha! It was a hypnotic trick. I have heard of such things in the Orient. That image was somehow projected on our wall and, in staring at it, we were subjected to a state of mechanically induced hypnosis which permitted the enemy to work without our conscious knowledge. We may well have been under the influence for two hours without knowing it and the trunks were carried through the door while we stared at the green Buddha with fixed and sightless eyes."

"Right," said the captain. "Like some of the tricks of the Indian fakirs. And say! There's an Indian in the very next cabin, a supposed nobleman who is booked as Sidi Mahavira."

He rushed to the corridor and soon opened the door of the adjoining cabin with his master key. The room was empty but a hasty search of the occupant's baggage disclosed a miniature stereopticon with a curled section of the film used in place of slides in these small projection lanterns.

"Here's your Buddha," said Anderson as he held the strip of film to the light. The case against Sidi Mahavira was complete.

Further search revealed the tiny hole which had been drilled in the partition to permit of projecting the image to the wall of the professor's room. This was plugged by means of a small cork colored to match the enamel of the metal partition. The first officer also discovered a snap switch and temporary wiring that had been used to control the lights in the adjacent cabin.

"So," gloated the captain, "you're another of them, Mr. Mahavira, or whatever your name is. And we'll have you in irons directly."

But the professor's trunks were not in the room and it was decided to postpone the search for these until after dinner.

The War Is On

THE evening meal was consumed in unwonted silence at the captain's table and many of the diners who had crossed with him before whispered in astonishment at the preoccupation of their usually jovial host. The professor was nervous and ill at ease and Roger stole occasional anxious glances at the blanched features of Irene.

Four hours later every stateroom and cabin of the *Albatross* had been searched. The baggage hold was carefully examined and the crew was at work shifting the cargo in the freight compartments. But no trace of the missing trunks had been found. Sidi Mahavira was strangely missing and the captain was completely mystified.

At the approach of midnight, with the lights of St.

Johns in Newfoundland just vanishing astern, Roger and the captain were joined by the professor and Irene at a point just about amidships of A deck immediately below the trap-door of one of the wells that extended up to the top between the gas bags of the huge cigar above them.

"Might they have escaped up through here?" asked Roger, pointing to the circular trap-door.

"It's possible," conceded the captain, "though not probable. It is a long climb up the ladder through these wells and the top is not the safest place to be when we are speeding along at over a hundred miles an hour. They would have had to haul the cases up there with ropes and it hardly seems this could have been done undetected."

"But," objected Roger, "there is the forward well connecting with the lookout platform on top. That one is equipped with a lift."

"You're right, Roger. But that one is guarded."

"True. But suppose we take a look at it."

"Right-o!"

They proceeded along the passage and turned into a niche just forward of the radio cabin. The guard who should have been stationed at this point was missing!

"What's this?" exclaimed Anderson. "Something has happened here at that!"

He touched with his finger a spot on the immaculate enamel of the bulkhead and brought it away stained red.

"Blood!" he shouted. "They've murdered one of my men. By God, I'll fix 'em!"

He tore at the latch of the trap-door overhead and it quickly swung downward, revealing the long black shaft above. The cage of the lift was at the top—it should have been below. At his manipulation of a starting lever on the wall the pulleys at the lower end of the shaft started revolving and the watchers knew that the cage had started its descent. The captain drew his automatic and climbed the short ladder into the compartment at the bottom of the well.

"Stay there folks," he ordered, "until I make sure the coast is clear."

In silence they watched as the cage came to rest and the captain gently lifted the body of a uniformed man into the compartment alongside.

"It's Calkins," he said sadly, "shot through the heart. Poor devil. Now, your war is my war, Professor."

There was a sound in the passage behind them and Roger wheeled suddenly to find himself looking into the muzzle of a blue automatic.

"Hands up!" snapped the voice of the dark-skinned individual whose grinning face appeared behind the gun.

The passage was filled with men—there must have been ten of them and each carried a weapon, ready for instant use. Then there came a roar from above and one of the yellow-skinned gunmen screamed and pitched forward to the floor. Roger pulled Irene into his arms as the captain's automatic spoke rapidly. The din in the narrow passage was terrific as the automatics of the attackers answered the lone one overhead. Then all was quiet and, through the acrid blue smoke, Roger saw that the captain was sprawled over the body of his erstwhile petty officer, Calkins. The professor had backed into the corner, hands raised above his head.

"Well," he snapped, "why don't you shoot and get it over with."

"Oh no, my dear professor," sneered the leader of the gang. "You are entirely too useful. Your life and those of your daughter and Mr. Erskine are to be spared for a higher purpose. Please be so good as to mount the ladder and enter the cage."

The professor stormed and Roger raged, but to no avail. It was with keen satisfaction that Roger noted that the captain had accounted for three of the enemy before he fell. Irene shuddered and cowered at his side but was considerably relieved at knowing that her father's life was in no immediate danger.

"Come now," again snapped the leader, prodding them into action with the muzzle of his automatic, "into the cage. We're going on top."

There was nothing to do but comply and they were soon crammed into the small car with the seven Orientals.

At the top they emerged on the lookout platform and there, in the light of the leader's flashlight, they made out the cases that contained the professor's apparatus. Overhead there came the throb of motors that entirely drowned out the musical purr of the engines of the *Albatross*. Roger strained his eyes as the sound drew near and quickly made out the flickering of landing lights that seemed to dart here and there above them with the uncertain wavering of fireflies. The leader grunted a command and the ship's floodlights sprang into dazzling brilliance, illuminating the landing space atop the *Albatross* to the brightness of day. It suddenly dawned on Roger that the purr of the great dirigible's engines had ceased—evidently the enemy had found means of choking the fuel lines.

And an airplane was about to land on the top of the great liner of the air!

The Professor Speaks Out

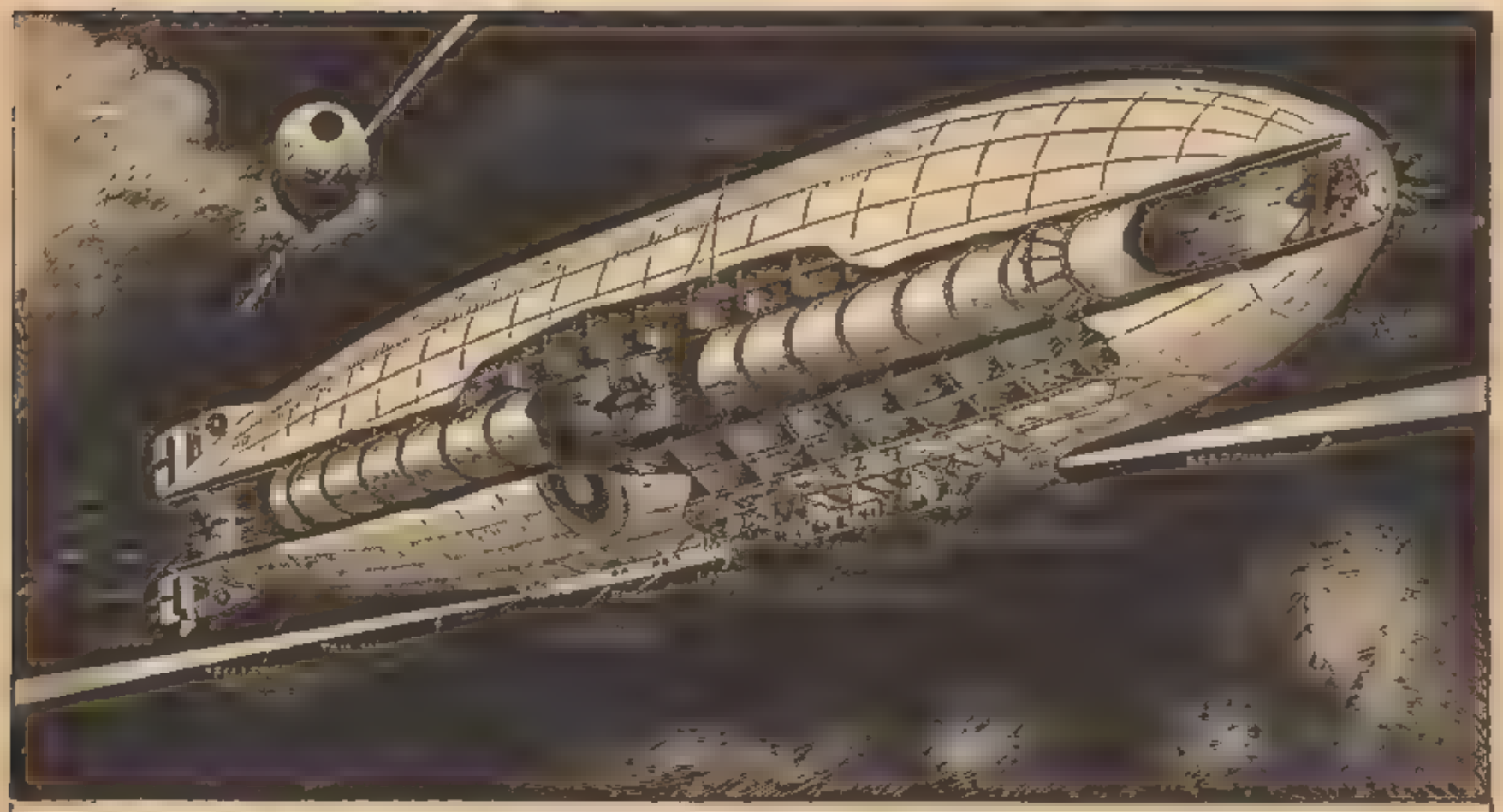
SLOWLY the *Albatross* swung about with the wind, gradually she lost headway while the airplane above circled lower and lower. In a surprisingly short time the landing was made, the huge cabin plane suddenly swooping down out of the blackness into the brilliance of the runway atop the dirigible. The roar of its three motors had ceased abruptly and the plane dropped to a perfect three-point landing at the far end of the runway, then came rolling toward them and was brought to a sudden stop alongside the lookout platform, brakes screaming in protest.

Two doors opened and from the first tumbled the pilot, a white man and apparently an American. From the rear door stepped two of the short Orientals and at a command from the leader they quickly loaded the professor's cases into the rear compartments of the plane's body. All hatches atop the *Albatross* had been fastened from the outside and there now came loud thumpings and shouts from beneath one of these.

"Inside," ordered the leader, prodding Roger with his gun.

They were no sooner inside the cabin than the wheel chocks were removed and the plane was swung around by the men outside. The leader thrust the three captives into a small compartment similar to that on a standard Pullman car and slammed and locked the metal door. But there was a window, and they watched as the plane taxied to the aft end of the runway and was then swung around once more to head into the light wind. There was the throbbing roar of the motors, the men outside clambered in and, with a quick short run and a sharp rise, they zoomed over the lookout platform and were off.

"Well," said Irene, looking from her father's drawn



THE above illustration is a reproduction of a drawing which appeared in the September, 1919, issue of the *Electrical Experimenter*. It is interesting to note that Mr. H. Gernsback predicted this type of machine, which the author of this story has also made use of. Moreover, we understand that such a machine is about to be tried out very soon.

The idea in a few words may be summarized as follows:

The Zeppelin type of airship has now an exterior power plant, which is underslung beneath the airship.

Mr. Gernsback has created a huge wind tunnel and installed the engines at various points in the tunnel. This arrangement creates a terrific suction, and the airship literally sucks itself through the air.

The advantages claimed by Mr. Gernsback are that wind resistance from the power plants is done away with, and accidents like that which recently befell the *Graf Zeppelin*, when several of the power plants went out of commission, are not likely to happen in this arrangement.

It should be easier to navigate an airship of this kind, because the wind-thrust against the underslung propellers of the old type is wholly wanting. Furthermore, the power plants are protected from the elements and repairs can be made with comparative ease while the airship is in flight.

and pallid features to the grimness of Roger's, "this is quite different from the trip we had planned. I wonder what is to become of us."

The professor seemed incapable of speech, but Roger's expression changed to one of worried abstraction and he appeared to be speaking his thoughts aloud as he replied.

"It is a peculiar procedure," he said. "I can understand their reasons for sparing your father's life—quite likely they are not sure they can completely solve his secret without instruction from him. But you—I can't see why they want to bring you along. Nor myself. What good we can be to them is beyond me. If they intend to kill us they might have done it more quickly and easily before we left. It's funny."

Professor Ingalls' eyes recovered their former luster and snap. "I'll never tell them," he averred. "Without certain information I have kept securely locked in my own brain they are helpless. The apparatus is there, to be sure, but without my aid it is useless to them. I shall not permit them to plunge our world into the hell of a devastating war even though my own life is forfeit."

Roger pursed his lips. He thought he understood now why they had kidnaped Irene—they would use threats against her to coerce the old man—but he did not voice his fears. He still was unable to account for his own presence aboard the swiftly flying plane.

The *Albatross* was left far behind and its lights receded rapidly, finally being lost to view as the great cabin plane of the enemy climbed higher and sped continually in what Roger took to be a northwesterly direction.

"Wonder where they'll take us, he ventured.

"Not to China, I hope," said Irene.

"No," said the professor, "I do not believe we are going that far—yet. They have divisional headquarters throughout the world and will undoubtedly take us to the nearest. This just goes to show how inefficient and slow-moving our government is. More than four years ago I reported my findings during the Mongolian expedition and I have been hammering at it ever since. Of course I did not report the results of my experiments since they were still in an uncompleted state. But I have repeatedly warned the authorities and suggested an investigation of the activities of the enemy in our own country. What have they done? Nothing. Either they think I imagined the whole thing or else they have just tabled my reports and recommendations and forgotten it as the idle dream of a crazy old scientist. Now, when they get the reports from the *Albatross*, some action may be forthcoming—perhaps!"

He spoke bitterly and a silence ensued.

The steady thrum of the motors was muffled by the soundproof walls and the double windows so that conversation in an ordinary tone of voice was not difficult. But the prisoners did not converse at any great length for the next hour. Each was occupied with his own thoughts and these were not particularly hopeful or pleasant. Irene worried about her father and he was in an agony of spirit as he came to the realization of what horrors might befall his cherished daughter at the hands of the conscienceless barbarians who had captured them. Roger thought mainly of the girl also—a shiver of dread came over him at thought of her fragile beauty in the clutches of such creatures as had murdered the captain and Calkins. The possible catastrophe to the world gave him scarcely a thought.

A Threat

THERE was the rattling of a key in the lock and the professor stiffened himself to tense expectancy. Irene turned her head and professed to be extremely interested in the moonlit waters beneath them, plainly visible through the window at which she sat. Roger leaned protectingly forward, interposing as much of his body as was possible between the door and the girl. But it was a white man who entered and he smiled cheerily as he looked directly at Roger. He closed the door softly behind him and shot the bolt.

"Hello, Erskine," he said.

"Tom Patton!" exclaimed Roger, springing to his feet. "What on earth brings you among these cutthroats and kidnapers?"

Their visitor laughed. Irene surveyed him with interest. He was a well-dressed young man—about Roger's age—with a massive head set between the shoulders of a pugilist. His broad features held much of attractiveness but there was a sinister gleam in his eye and a sarcastic twist to his smile that belied the friendliness of his greeting.

"You insult my friends, Erskine," he laughed. "They are not cutthroats, nor are they as bad as you are implying. True, you three have been taken from the *Albatross* without your consent but there are many good reasons for this procedure and in the end you will all thank us for it. Might as well be on the winning side you know."

"I'm not surprised at your being identified with them," coolly retorted Roger. "You always managed to get in with the worst element at college—and since."

Irene and the professor listened in astonishment. The animosity displayed by Roger gave them little hope of receiving help from this white man. Tom Patton devoured Irene with his eyes and a flush of shamed embarrassment chased the pallor from her cheeks.

"You are unkind, Erskine," he smirked, "and you should endeavor to conquer this feeling now of all times. I have much power with the Gautamans and can make things much easier for you—if I so desire."

"The Gautamans?" interrupted the professor.

"Yes. After Gautama Buddha, founder of the religion."

"You, a Buddhist?" asked Roger, in mock solemnity.

Then there came an astounding thing—a wink intended as a sly grimace but actually contorting the face of Patton into a gruesome semblance of that of the popular conception of his satanic majesty. Irene turned cold.

"No—not exactly, Erskine, old top," he drawled. "But allied—mind you I say allied—with the Gautamans for our common good."

"I'll wager it's a one-sided arrangement," grunted Roger.

Patton scowled. "Snap out of it, Erskine!" he snarled. "You are in my power and there's been about enough of this. And I warn you to be more civil and to submit gracefully or things will go much harder—with all of you."

Roger observed his greedy glance in Irene's direction and, perforce, subsided.

"Now," continued their evilly grinning captor, "I know you are curious so I am going to advise you as to your fate. We are now entering Davis Strait and by morning will be somewhere over Grant Land or Sverdrup Island. By ten o'clock we shall have reached our destination, an uncharted island in the Arctic ocean. Here are the North American headquarters of our organization and it is from this base we are to operate—with your assistance."

"With our assistance?" snapped the professor.

"Yes. With your assistance—yours and Erskine's. Don't think we are unprepared to force this assistance. We have many means—many very persuading and always successful means. You, Professor, are to instruct our scientists in the uses of your marvelous invention, using the equipment now stored in the tail of this ship. You, my dear old college chum, are to assist in building up our air fleet, which is to become the most dangerous in the world."

"If we refuse?" said Roger, his eyes flashing fire.

"You'll not refuse," smiled Patton confidently.

The professor started to expostulate but was quickly waved into silence. Patton approached Irene and she looked up at him fearfully.

"And the beautiful young lady," he continued with an ugly leer. "We'll see—we'll see"

With this cryptic and disquieting remark he turned on his heel and left the room, again locking the door from the outside. They gazed helplessly at one another after he had left.

CHAPTER IV

Taking Stock

THEY slept fitfully during the night, making themselves as comfortable as possible in the thinly upholstered seats. It grew quite cold toward morning and Roger tiptoed to the side of Irene who partly reclined on the single settee, covering her thinly clad body as best he could with his own coat. The professor stirred and opened his eyes.

"What is the time, my boy?" he asked.

"Five-thirty."

The professor sighed and sat erect. "I was sure it was much later," he whispered, rising and walking stiff-kneed to the window. He grimaced at the pains in his joints. "Not as young as I used to be," he concluded gravely.

Roger smiled at the comical expression on his countenance.

There was a peremptory knock at the door and Irene was startled into wakefulness.

"Damn!" ejaculated Roger under his breath. Then he drew the bolt he had so uselessly shot after Patton's leaving.

One of the Orientals entered with a tray. "Breakfast," he stated laconically.

"They're not going to starve us at any rate," commented Roger when the door closed behind their early visitor.

"Might the food not be drugged?" asked Irene, endeavoring to rearrange her glossy hair.

"I think not, dear," responded her father. "They wish to keep us alive and well—for a time at least."

And the coffee did smell inviting.

Irene flushed slightly and whispered a "thank you" when she discovered she had been covered by Roger's coat and handed the garment to him. They were not long in consuming the tasty and generous portions and, with the coming of the warmth that followed the turning on of the electric heat from somewhere outside their small room, they felt more comfortable.

It was not long before they were again visited by Patton and this time he brought with him several magazines which he presented to Irene with a great show of solicitude. Roger could have punched his smirking

face but he contented himself with thrusting his hands in his pockets and gazing from the window at the unbroken ice field that now glistened far beneath them.

"We're ahead of schedule," volunteered Patton pleasantly. "Be there in two hours now. Good pilot we have—Harry Borden. By the way, Erskine, he's a New York boy. You'll like him."

"Yes?" said Roger, not deigning to turn around.

"Yes. And you'll all need warmer clothing when we land. I'll see that you are outfitted."

He retreated without further speech and this time he did not lock the door. Evidently he had no fear of any action the captives might take. Roger gritted his teeth in helpless rage.

The professor tried to estimate their position from what Patton had told them the preceding evening.

"Let me see now," he said, "Sverdrup Island, which he mentioned, lies in about ninety degrees longitude west from Greenwich. It extends above eighty degrees north latitude. Grant Land, which he also mentioned, is farther east and extends to about eighty-three degrees north. We have passed whichever we crossed so we may assume that we are at about one hundred degrees west and say eighty-five north. Why, good Lord! We're three thousand miles from where we were picked up. And, in little more than eight hours!"

He stared at Roger, open-mouthed.

"Yes, I knew this was a very fast ship," said Roger. "There are a few of these big monoplanes that can do five hundred miles an hour when above thirty thousand feet."

"But the friction," objected the bewildered professor, "the loss of propelling effect in the rarer atmosphere. I must be sadly out of date since I have been sticking so closely to the laboratory."

"Some very recent developments are responsible, Professor," smiled Roger. "New ideas in streamlining and in lubrication of the external surfaces have reduced friction enormously. Then besides, on ships of this sort, the propellers are supplemented by the reactive effect of a multitude of rapid explosions in gun-like tubes beside the tail. Sort of a rocket action, you know."

"I had not heard that was being commercially used. I surely am behind the times."

"Oh, not so far, Professor. To my knowledge there were no more than six of such ships in existence. And what puzzles me now is how one of the few came into the possession of these Gautamans, or whatever they call themselves."

"Evidently they have made rapid strides since I first learned of their existence. And they must have on their side some wealth and some scientists as well."

"It seems that way. And I am wondering whether such alliances were made by force as they propose to obtain our services."

"Not necessarily. There are a whole lot of fools in this world, Roger. Also there are many conscienceless men of wealth and influence who will go into any kind of venture that gives promise of increasing their already swollen hoard. And somehow this idea of a religious war strikes me as a bit of irony, especially as directed against our own country. We who have been at the mercy of the fanatics for so many years are now threatened by fanatics of a different kind, whose prohibitions and rituals, while of a greatly different sort, would prove equally irksome and quite probably as flagrantly ignored"

Roger nodded a thoughtful agreement.

The Arrival

THEY were interrupted by the entrance of a slinking, brown-skinned hunchback who was loaded down with heavy clothing. There were warm, fur-lined boots for all, fur caps, coats and mittens.

"Mr. Patton said the brown coat is for the lady," said the deformed one as he sidled from the door.

Irene picked up the garment indicated and was astonished to find that it was fashioned from the finest sable and was beautifully tailored and lined. She held the handsome coat to her face and buried her cheek in its rich softness, exclaiming aloud delightedly.

Roger successfully repressed a snort. "These Gautamans," he remarked to the professor, to hide his rage at Patton, "speak very good English, whatever their color. Almost without accent, too."

"Probably all educated in our own universities," was the response. "Another bit of irony."

There was a change in the note of the motors and the staccato rattle of the reaction tubes ceased. They were slowing down and the angle of the floor told them of the start of the glide to a lower altitude. They crowded to the single window.

Far below spread the vast, almost unbroken, expanse of the ice field, drearily monotonous. For some considerable time they saw nothing to break the monotony. Then, when they had reached a point only a few thousand feet above the broken surface, the plane was banked and started to circle. A minute later they saw their destination, a rugged island, a single mountain peak it seemed, that thrust itself upward through the ice to a height of fully two thousand feet. There were no signs of life on the steeply sloping sides but at the top there was a flat space on which there appeared a modern landing field and a number of hangars.

"They do not seem to fear discovery," remarked Roger.

"No," agreed Professor Ingalls. "Right out in the open. But then, we are a long way from civilization, off the regular air lanes, so there is very little danger."

"Yes, and there are disappearing guns under that innocent appearing surface," came the voice of Patton, who had slipped into the room unobserved.

Roger bit his lips to hold back the retort that sprang to them unbidden. It was too early to start trouble.

Swiftly they descended, the circle becoming ever smaller as the pilot brought his ship to the level of the polar retreat. They could plainly see the sock as it swelled to the breeze, indicating the direction of the wind at the surface. A moment later they had touched with scarcely a jolt and rolled across the field to a stop.

"Better get into those wraps," advised Patton. "You'll not be in the air for long but it's forty-three below out there so you'll need the furs."

Without protest they bundled themselves into the clothing he had provided and were soon at the door of the cabin. The rest of the passengers and the crew had already quitted the ship but Patton handed them from the exit with mock courtesy. He was especially considerate of Irene.

"Welcome to New Kurja," he exclaimed as their first breath on the strange soil drew in the searing frostiness of the unbelievable cold.

A group of heavily furred individuals was gathered about the entrance of the building toward which they were led by Patton and it was necessary for them to run the gauntlet of the gaping, jabbering crowd. Irene clung to the arm of her father on the

one side and to Roger on the other, burying her face in the huge collar of her fur coat. Roger was conscious of a sea of staring faces, some white, some brown, some yellow. Then they were within the building and were hustled to a waiting lift.

Chandra Dai

THEY descended rapidly for many hundreds of feet and eventually stepped from the cage into a brightly lighted corridor. Patton led them through this corridor to a small metal door which he opened and passed through without ceremony. Instead of a temple-like interior, the shrine of the Buddha, which they had fully expected to enter, they found themselves in a large room that might well have been the office of a great American business executive. At a large desk that was placed in the exact center of the heavy Chinese rug which covered the middle of the floor, there sat a man—a man who, but for the slightly darker complexion and the exceedingly glossy black hair and mustache, might have been that very executive. He looked up inquiringly at the approach of Patton.

"They are here, Chandra Dai," stated that worthy in a most surprisingly deferential tone.

"It is well."

The sinister black eyes surveyed them with cold calculation, resting long on the figure of Irene, who had thrown back her heavy coat in the warmth of the underground quarters.

Roger made as if to speak but was silenced by a stern look and a warning motion of Chandra Dai's hand. That same hand, with its long-pointed fingers, strayed to a row of buttons on the desk top. Three of these he pressed in turn—then he spoke.

"You will all three proceed to your quarters," he said, in a steely voice, "where your instructions will be given you in a short time. Do not attempt resistance for it is useless and will cause much unpleasantness to yourselves. We shall come to a complete understanding within the hour."

He smiled meaningly as he concluded. A giant negro, unclad with the exception of trousers and shoes, had entered the room. Chandra Dai pointed to the professor as if designating an unimportant article of furniture.

"Ben Sair," he addressed the negro, "take him to R-141 and there await instructions."

The professor bowed his head and hesitatingly followed the big black man. Irene cried out and made as if to follow.

"Fear not, Miss Ingalls," came the voice of Chandra Dai, with an almost feline purr, "no harm will come to your father—nor to yourself. You must only obey orders."

Irene tossed her head but forebore replying. A heavy-featured white woman who had entered unobserved stepped to her side. She was a veritable Amazon and Irene recoiled at the touch of her hand.

"Come, young lady," boomed the Amazon's voice. "Don't be scared of Molly Cork. I'll take ye to your rooms."

Irene followed as had her father, throwing a glance of encouragement to Roger as she passed him.

Another arrival appeared in the form of the young chap who had left the pilot's seat of the raiding plane when it landed atop the *Albatross*. He was a smiling faced, chunky individual and Roger took an immediate liking to him.

"Borden," came the voice of Chandra Dai, "you will escort Mr. Erskine to BX-18 and remain with him until further orders reach you. That is all."

He turned his attention to Patton, who had drawn near, and Roger followed the quick, rolling steps of Harry Borden as he led the way to a door at the far end of the room.

They passed through a long corridor, entered a lift, and were dropped several hundred feet deeper into the recesses of the strange honeycombed mountain. When at length they reached the quarters that were to be Roger's he expressed his amazement to his comically grinning guide and guard.

"These must be tremendous workings we are in," he exclaimed. "I can't conceive of this retreat being the work of human hands."

"You don't know the half, brother," grinned Borden. "This is some joint you've come to. There's about fifteen thousand people housed here and this old hollowed-out mountain they call New Kurja is bigger than one of those new hundred-story skyscrapers in New York. There's factories too and arsenals and a church—a temple I mean."

Forceful Persuasion

ROGER gazed at his guide in amazement. The rooms to which he had been assigned would have done credit to the finest of first-class hotels and everything had been provided for the comfort of the occupant.

"But I don't get it, Borden," he said. "Does this place form a headquarters for these Gautamans? And are you one of them?"

Harry Borden indulged in a broad grin and a significant wink. "Sure, it belongs to them and I'm one of them. But say—this Buddhism business is the bunk. This is an armed camp and is here for no other reason than to prepare for the big war. The religious stuff is just camouflage."

"You mean the plans are not really for a religious war but for a plain war of conquest to satisfy somebody's lust for power and empire?"

"That's about the size of it. But the Buddhist idea is at the bottom of it all. The way I get it, it is something like the old crusades of medieval history. The religion of Buddha originated in India as a heresy, quickly gaining a strong foothold and spreading throughout the Orient. Finally it died out pretty much in India but became very strong in China and Japan. Between the fifth and ninth centuries the Buddhists underwent great persecution in China and in the ninth century they amalgamated in Japan into the Ryobu-Shinto, the dual Shinto. The rituals have altered greatly since that time but the faithful have constantly increased in number and have spread all over the world, though this is hardly suspected in English-speaking countries. Buddhism never fully recovered from the great persecution of the ninth century in China, when 40,000 temples and monasteries of the religion were razed. Neither has it ever forgotten and for many years a revenge has been planned. India is to be conquered and forced to again enter the fold, the East, Russia, Europe, the Americas are to follow. Buddhism is to be established as the world religion—compulsory, of course. But the dream of the true believers has been commercialized by clever politicians and shady financial interests of all lands and it is to really work out as a huge world revolution that will take the power out of the hands of the 'ins' and put it in the hands of the 'outs.' An absolute monarchy is to be set up and

all the world is to become subservient to a Supreme Lama, who will be none other than—"

The name remained unspoken for there was an angry buzz from an instrument adjacent to the writing desk and Harry hastened to this apparatus. He touched a lever and the voice of Chandra Dai spoke sharply.

"Dial CR-7," it commanded, "and show Erskine the happenings on the screen."

The voice ceased and Borden manipulated a dial like that of an automatic telephone. A screen of about two feet in length and slightly less height illuminated brightly and showed in clear relief the interior of a laboratory of considerable size where sat Professor Ingalls before a long bench on which there were arrayed a multitude of scientific instruments and much paraphernalia. Strewed on the floor were the professor's opened cases and a litter of excelsior and torn paper showed the haste with which they had been unpacked.

Over the professor's stooped form leaned the sinister figure of Chandra Dai.

"Will you agree, Professor?" he asked in silken tones.

"Never!"

Chandra Dai spoke sharply to Ben Sair, whose great bulk stood propped against the near wall of the laboratory.

"The slide, Ben!" he ordered.

Then the huge negro drew back a panel of the wall and Roger let forth a yell of fury that rang out simultaneously with the shriek that came from the professor's throat. The panel opened into a brightly lighted room—Irene's boudoir—where the panic stricken girl retreated before the menacing figure of Tom Patton. She drew her negligee about her slim body and screamed again and again as the evil face of Patton neared her own.

"My God!" groaned Roger as the professor slumped weakly into his chair. "Can nothing stop them?"

"He'll agree," replied Borden, soothingly. "Watch!"

The scene and the sounds issuing from the combined voice-television apparatus impressed themselves indelibly in Roger's memory. Irene's screams and the sheer terror in her face caused him to seethe with fury. Patton's fingers were now twisted in the folds of her filmy garment—he seemed about to tear it in shreds. Professor Ingalls, shaking as with the ague, nodded violently to indicate his consent. He was too overcome to speak.

"Stop, Patton!" called Chandra Dai.

Irene slumped to the floor as her assailant turned on his heel and left the boudoir. Ben Sair closed the panel slowly.

"You win," came the professor's voice, faintly. "We'll start with the disintegration of hydrogen atoms."

He reached for a stoppered test tube.

CHAPTER V

Erskine's Turn

SEVERAL days passed and Roger had not yet been approached with regard to his own expected espousal of the cause of the Gautamans. Harry Borden remained with him constantly and his liking for the cheerful pilot increased hourly. But he found it difficult to obtain further information from him regarding the activities of Chandra Dai and his followers. He did learn that Harry was a fugitive from justice, having become embroiled in certain smuggling and hijacking operations in the States. But Borden had evidently been warned against speaking too freely regarding the plans of the Gautamans. Perhaps he was not as well informed himself as might be.

Only at meal time did he see the professor, though he was permitted to visit with Irene more often. The meals, excellently prepared and served, were eaten in a small dining room where Chandra Dai presided at table. He seemed bent on keeping the three captives under his watchful eye and continued to dine with them in private. His manners were those of the cultured host rather than of the stern jailer and he steadfastly refused to speak of their incarceration or of the reasons for it. To Irene he was the personification of courtesy and gallantry—he was a bit too attentive, Roger thought.

The professor spoke not at all of the experiments that were under way in the laboratories of New Kurja. He seemed to shrivel and wilt beneath their eyes when they addressed him. His great spirit was broken—for the sake of Irene's safety he had sacrificed honor and prostituted his scientific knowledge to the greed of an infamous horde of criminals. Irene brooded and fretted over the all too apparent failure of his general health and vigor.

There came a day when Chandra Dai spoke abruptly of his plans for Roger.

"Erskine," he said, at the noonday meal, "yours is to be a great honor. You are to become commander-in-chief of the air forces of the Gautamans—under your able direction this air force is to grow from its present nucleus to the greatest and most destructive in the world."

"If I refuse?"

The master smiled. "That you will not do," he stated confidently. "As you observed in the case of the professor, we have means of overcoming the scruples of ordinary mortals. No, you'll not refuse. And, you must not think that, in your goings to and fro in our aircraft, you will be able to escape. Every craft you occupy will be constantly watched in our television screens and, at the first evidence of treachery, the gas tank will be fired by radio. We are already fully equipped to do these things."

"If I agree?"

"You will immediately set about inspecting and testing our present equipment and formulating plans for the altering of the present craft to incorporate the new disintegrating-ray apparatus we are developing with the professor's assistance. You will also supervise the design of new and speedier craft that will utilize the atomic motor, likewise being developed with the professor's kind assistance. Your experience has fitted you for the further work of organizing a number of factories throughout the world to produce in great quantities the new craft to be developed by you, to supervise the training of instructors who will, in turn, make first-class pilots of the required number of recruits. Then, when the great day comes, yours will be the honor of directing the activities of the great fleet that is to bring destruction to the world from the air."

Roger gasped. "You expect me to wage a war of destruction against my own people? To assist the enemy, whose cause I cannot embrace, in a ruthless campaign against those I love and honor?"

"There is no alternative, save perhaps—hari kari. And we shall guard carefully against that possibility. Is it not better, moreover, to destroy than to be destroyed?"

A hot retort sprang to Roger's tongue but the pro-

fessor, not looking up from his plate, kicked his ankle violently under the table. He choked back the impulse and hastily swallowed a portion of food to hide his rage.

The master watched him narrowly. "This afternoon," he continued, "you will make a flight in one of our small pursuit planes, paying particular attention to its flying qualities and construction. I shall expect a report of your findings and recommendations as to the changes of design necessary to adapt these planes to the new motive power and armament. Borden will accompany you."

"Might I go along?" asked Irene.

Chandra Dai smiled at her indulgently. "These pursuit planes are not large enough for three passengers," he explained. "Besides they have open cockpits and it would be very cold."

Irene pouted coaxingly. "But I would so enjoy the ride," she begged.

The professor broke into the conversation. "It would do her worlds of good, Chandra Dai," he said, kicking Roger's ankle once more to indicate his desire that she be permitted to go.

The master hesitated. Irene smiled archly.

"Very well," he agreed. "We shall use one of the five-passenger cabin planes for the first flight and you may accompany Erskine and Borden."

Irene thanked him profusely and he beamed his good nature. But the steely crispness returned to his voice when he again addressed Roger.

"You will prepare the same sort of report on the cabin plane, Erskine," he ordered, rising from the table.

Roger bowed in order to hide the scowl that wrinkled his forehead.

The Professor Acts

AN hour later Roger and Borden ascended to the surface where they were met by Chandra Dai, who had accompanied Irene to the hangar. A sleek, single-motored cabin plane of the type that had signalled the *Albatross* awaited their coming. And, at the door, stood Tom Patton, smiling satanically. Roger wanted, more than ever, to punch that evil face.

"Patton will accompany you," stated Chandra Dai, shortly.

Irene shrank from him as she entered the door of the cabin.

Harry Borden whispered encouragement in her ear. "Don't worry about that baby," he said, "I can take care of him."

With Borden in the pilot's seat and Roger at his side, Irene and Patton occupied the passenger seats in the rear. A gang of waiting coolies trundled the ship from the hangar and headed it into the wind.

"Great old crates, these are," said Borden as he snapped the starting switch that sent the four hundred horsepower radial barking and sputtering. "They start hard in this cold though."

It was several minutes before the engine had warmed up enough to fire evenly and Chandra Dai's sinister leer graced the window until Borden waved his arm. Then he withdrew his face, the chocks were removed from under the wheels and, with the roar of the gunned motor, the plane slipped rapidly along the smooth surface of the artificial field. Simultaneously they saw two of the smaller pursuit planes taxi over the field and these took to the air before the tail of their own ship was off.

"You're being well chaperoned, Erskine," said Patton spitefully, as their ship swung out over the dreary ice pack. The two small planes circled about and fell in behind the larger ship to follow in triangular formation.

Roger deigned no reply, but he eased himself into such a position that he could watch Patton from the corner of his eye.

Borden headed due south and began a running fire of comments regarding the good and bad points of the ship.

"She handles nicely for such a heavy crate," he said, "and you couldn't bust her up with a cyclone. All steel you know, with welded struts and reinforcements. There's a gun back of Patton there and here's the trips of the two tunnel guns."

He pointed to the butts of the twin guns that projected into the cabin underneath the instrument board. Webbed belts of shining ammunition were in place and Roger shuddered as he thought of the streams of flaming death that could spew from those weapons at a mere pressure of the trips. He had never fired a machine gun but he fully understood their operation and capabilities.

"How much fuel do you carry?" he asked.

"Enough for about five thousand miles," came the reply, "and the tanks are full now. But we ain't going that far, this time."

The irrepressible Borden laughed. But Patton was intent on making the trip unpleasant.

"Look here, Erskine," he interrupted. "Here's the way they keep tabs on you back in New Kurja."

He pointed to a pair of metal discs set into the cabin ceiling. Each was of ten inches diameter and of dull gray color.

"Television transmitter and receiver discs," he explained, "and continually in use at the other end. Watch."

He snapped a small switch and one of the discs flashed a view of the operating room at the base where a number of similar screens were closely watched by attendants. He manipulated a dial and the scene changed, shifting from room to room of the stronghold they had left far behind. He stopped the action when a view of the laboratory was obtained. Irene gurgled delightedly as she saw the figure of her father bent over a complicated mechanism with which he was working. In the room there was Ben Sair and three other assistants and Chandra Dai himself was watching the experiment. A beam of crystal-white light shot from out the apparatus and impinged on a small test tube from which there came a wisp of smoke. Then, as they watched interestedly, a surprising thing happened. The professor suddenly straightened up and the light beam shifted quickly in the direction of Chandra Dai's mid-section. There was another wisp of smoke and Chandra Dai vanished into thin air. Ben Sair fell to his knees and they could see his black jaws chattering with fear.

"God! He's killed the master!" exclaimed Roger.

Patton chortled as Irene covered her eyes with trembling hands.

"Now, I am the master!" he shouted.

Warren Ingalls' Sacrifice

BACK in the laboratory of New Kurja, Professor Ingalls spread terror among the remaining occupants of the larger room. He swung on his heel as two of the laboratory assistants made a rush for him. He swung the devastating beam of mysterious limpid light and the headlong dash of the two aggressors

ended abruptly with the complete disintegration of their bodies. Flickering pin-points of short-lived brilliance were all that marked the instantaneous transition from palpitating living organisms to nothingness.

Ben Sair cowered against the wall, shivering with superstitious dread—to him this glittering-eyed white man was a reincarnation of some long-forgotten voodoo. But the other assistant, a lithe Burman, had slipped behind a large cabinet and he started blazing away with an automatic. Fortunately for the professor, his aim was none too good, for the setting of the death-ray was such that the metal cabinet formed an insulator. In the short interval in which the professor made rapid adjustments to his apparatus, the Burman emptied the magazine of his weapon without causing other damage than the shattering of much glassware and the demolishing of a wall-mounted television screen. Ben Sair was speechless and helpless with fright and his eyes rolled until only the whites were visible.

Then the Burman slipped a fresh clip of cartridges into his gun and took more careful aim at the professor, just as the crystal ray changed color and became a vicious carmine. Simultaneously with the shot that struck the professor in the left shoulder the metal of the cabinet spurted a shower of sparks with a hiss and a rumble that shook the floor. The Burman vanished as had the first three.

The big negro recovered some of his courage as he saw that the professor had slipped to the floor and was weakly attempting to stanch the flow of blood from his shattered shoulder.

"Mister Professor," he said, in quavering voice, "let me help you. Just don't turn the lightning machine on Ben Sair and he'll stick to you."

"All right, Ben Sair. Come here and bind this up."

He had torn a strip of linen from his shirt and the negro bandaged the lacerated shoulder as best he could with palsied fingers.

"Now, help me with this other machine," said the professor, as he struggled to his feet and dragged his weary body to another and still untried mechanism that had just been completed under his instructions.

This incorporated the usual impinging disc and conical collector of the cosmic rays, but there were no less than twenty-five prisms and reflectors to segregate separate elements from the conglomerate assemblage brought in from the depths of space. A series of filters and intensifiers directed the separate components onto a platform whereon there reposed a lump of antimony no larger than a walnut. The two movable poles of a huge electro-magnet were brought into close proximity to the lump of antimony as the professor manipulated a hand-wheel at either side of the platform. When all adjustments had been completed to his satisfaction he pulled the lever of a starting box and there was the smooth whir of a motor from somewhere within the mechanism. In a hollow, shiny sphere beneath the platform there rose the hum of a thousand bumble-bees and scintillating lights played over the reflectors and prisms. The small lump of antimony glowed with an unearthly light and it seemed to quiver and pulsate like a living thing. Ben Sair watched with increasing concern.

"Ben Sair," mumbled the professor, who was rapidly weakening, "we are going to save the world, you and I. We are going to save Roger Erskine and my daughter out there in that airplane. When New Kurja is gone, Roger will find means of overcoming the vicious Tom Patton and of saving Irene. Something tells me that all will be well with them. At any rate, it is their only chance."

The negro did not understand. He knew only that the weird, flaming nugget on the platform of this crazy white man's machine was dancing and whirling like a dervish afire. As he watched it with bulging eyes it grew larger and larger until it was as big as a baseball. Faster and faster as the poles automatically moved apart the lump spun, taking on mass from the acquisition of electrons from the disintegrated components of the surrounding atmosphere. It expanded until it seemed to be touching the pole pieces between which it rotated so speedily. The poles could move no further apart.

The professor looked on with glazing eyes. He clung to the work bench for support. There was a smile of triumph on his face.

"Success! Success!" he exclaimed.

Suddenly Ben Sair was overcome with nauseating fright. His teeth chattered anew and, with an abrupt maniacal impulse, he sprang for the professor's throat.

It was a short struggle, for the professor's vitality was ebbing fast and those great black paws had the strength of relentless savagery. But Professor Ingalls went to his reward with peace and joy in his heart. His last conscious thought was the unquestionable certitude of Irene's safety that came to him somehow from the great beyond into which his soul was passing.

Ben Sair rose to his feet and his savage intellect grew foggy when he saw that the platform and the electro-magnet had vanished along with most of the remainder of the strange machine, and that the whirling sphere was now the size of a cocoanut and spun unsupported in the position in which it had reposed. In an accession of uncouth fury he picked up an iron bar from a nearby tool rack and struck violently with it at the spinning ball of fire. At contact of the cold metal there was a blinding flash and the bar was torn violently from his hands, merging into and becoming a part of the strange orb which was now deflected from its position and swung away from the remains of the machine in a reeling, zig-zag path. His hands were seared bare of flesh and he screamed with pain.

The nebulous mass gathered speed in its movements and knocked about the laboratory with rapid acceleration, annihilating and taking into itself every object with which it contacted. The very air of the room grew rare as it contributed to the ever-increasing mass of the uncanny thing the professor had created.

The End of New Kurja

THE laboratory became a veritable gehenna The metal walls vibrated to the unearthly influence from within the whirling, darting globe. Ben Sair screeched when he looked at the bare flesh of his chest and saw that it glowed and twitched with the movements of rivulets of purple flame that crawled rapidly over the skin in a swiftly spreading network. His arms lost their tremendous muscular power and he grew as weak as a child. His legs failed to support the black bulk of his body and he fell to his knees and crawled painfully toward the door. The floor reacted to his touch with a stinging vibration that further numbed his muscles and paralyzed his joints. He was barely able to reach the door and draw the bolts and, when he had accomplished this, he lay in an immobile heap across the sill. There were shoutings and rapid footsteps in the corridor but they came faintly to Ben

Sair's consciousness through the ever-rising roar of the commotion within the laboratory.

New Kurja was shaken to its foundations and the inhabitants were rushing blindly from passage to passage, seeking the cause of the disturbance. There were outcries and arguments. A voice called loudly for Chandra Dai and Ben Sair tried to reply. But his voice refused to answer to his will. The mammoth fiery ball was upon him and, with a final hopeless struggle, he was taken painlessly into its rapacious, roaring interior.

The ceiling collapsed with a twang like a snapping violin string of Brobdingnagian proportions. With it there came the heavy furniture from the floor above—all went to swell the now bloated monster of destruction. Over the din there came the shrieks of the Gautamans who scrambled for the lifts in futile attempts to escape. On the uppermost surface mechanicians were frantically struggling with the motors of all available planes. None of them would start, for the ignition systems were paralyzed by the emanations of that inexplicable fury that was ploughing its all-devouring way through the lower levels, gaining in bulk and destructive power as it progressed.

Then, with a groan and a shudder, the mountain that was New Kurja dissolved like melting paraffin and sank with a convulsive protest into the polar sea. The massed ice shriveled and drew away as if in alarm and an immense seething, steaming cauldron marked the spot. Then with a final turbulent uproar a geyser shot skyward, red-lit and awe-inspiring. When this subsided all was still and nothing remained save a half-mile circle of open water that quickly glazed over with newly-forming ice.

CHAPTER VI

The Struggle in the Plane

THE four occupants of the cabin plane which had left the base so short a time before watched the destruction of New Kurja in the television screen. Irene sobbed out her grief at the passing of her father, knowing full well that his sacrifice was made in a desperate hope of saving her and with the very definite intent of upsetting the plans of Chandra Dai and his ilk. Tom Patton became a raving maniac as his hopes of personal glory and power tottered and fell. Harry Borden kept the ship to her original course and watched the pictured holocaust with considerable of awe but with little apparent regret. Roger was dumfounded at the development and did his ineffectual best to comfort the unexpectedly orphaned girl. Her sobs continued unabated as she turned from the screen before the final curtain was rung on the tragedy.

Then, when the last vestige of New Kurja had disappeared from their view, Tom Patton grasped Irene by the wrist and menaced Roger with his automatic. He snarled out a savage oath as he drew the resisting girl to the seat she had previously occupied, keeping Roger covered throughout the maneuver.

"Borden," he ordered, "New Kurja's gone and so is Chandra Dai. But the cause lives on and I intend to obtain control of the other base near Point Barrow. You'll head there at once and there I'll become master. This dizzy blonde will be—mistress."

At the insult Roger ducked quickly and threw his full weight into a lunge that carried him into a desperate grapple with the infuriated Patton. He grasped the wrist of the astonished outlaw in time to spoil his aim and the bullet intended for Roger's heart sped harmlessly through the roof of the cabin. But Patton wrenched himself free, loosing his hold on Irene as he did so. He backed from Roger's furious rush and again raised his pistol.

Borden had risen from his seat, a scowl of rage on his rotund countenance.

"Cut it, Patton!" he snapped. "You'll get us all killed."

Patton laughed and swung his weapon in the pilot's direction, firing rapidly. Roger swung out with his right and caught the madman full on the jaw with a terrific punch, but too late to save poor Borden. Patton's first shot had struck the jovial pilot in the forehead and he fell lifeless over the back of his seat, his head drilled through. Patton went down under Roger's blow but he quickly scrambled to a sitting position and fired once more. Roger opened his mouth in surprise and clamped his hand to his right thigh where the metal-cased bullet had struck.

Meanwhile, without a pilot, the plane had gone into a spin and the three living occupants were tumbled in a heap on the floor of the cabin. Roger obtained a firm grip on the muzzle of the automatic and slowly but surely twisted it from Patton's grip. Then, from an almost prone position, he struck out wildly with the weapon again and again. A mist had gathered before his eyes but he felt the contact of the pistol butt as it crashed into Patton's skull. The mist cleared and he saw that Irene had fainted and was wedged between her seat and the wall of the cabin. Patton's face had disappeared in a bloody smear and he lay quite still where he had rolled. Dazedly Roger crawled along the wall to the pilot's seat and grasped the stick; hazily he fussed with the controls, trying to remember how to pull out of the spin. The gray expanse of ice below came rushing upward, whirling dizzily as it loomed closer and closer. Then the mists cleared once more and he remembered. The nose of the ship came up and they were safe—but not a hundred feet above the menacing ice pack. The motor was still pounding steadily under full gun and they gained altitude rapidly. Roger had entirely forgotten the two pursuit planes that had followed from New Kurja.

With the ship levelled off at a safe altitude he turned to see whether Irene was regaining consciousness. She smiled wanly but encouragingly from her seat, which she had regained unassisted.

"All right, dear?" he asked.

"I'm all right," was the brave reply. "Are you?"

"Right leg's completely numb," he said. "But I can get along. Is Patton dead?"

"Quite," said Irene with a shudder.

The body of Harry Borden had rolled aside and wedged under the seat alongside his own and Roger regarded it with something of real sorrow in his heart. He would have to dump the two bodies overboard but he would wait until feeling returned to that numbed right leg.

Then a surprising thing occurred. The ship seemed to shudder from the impact of bullets that suddenly raked the cabin from stem to stern. One of the pursuit planes had turned its guns loose on them!

Roger had never been in an air fight but he was an experienced flyer and had a good idea of how it should be done. Stunting was not easy with the heavy cabin plane but he zoomed up and rolled over, bringing the nose of the ship around. He saw the nose of one of the pursuit planes headed directly for him and he

ducked instinctively, shouting to Irene to do likewise. Glass from the front window spintered and flew past as a burst from the small plane sputtered through. He brought the nose of the ship all the way over and found the other pursuit plane dead on the sights of his own guns. Hardly realizing what he was doing nor why he did it he reached out and pressed the trips. He watched the burst as it stippled a pattern across the windshield of the small plane—saw the pilot fling his arms outward and slump against the forward crash pad. He had made a killing at his first try!

Irene Saves Them

BLACK smoke came from under the motor housing of the pursuit plane and she slipped into the spin that would carry her to the ice far below. Forgetting the other ship, forgetting everything save that he had shot down a fighting plane in actual combat, he followed in a dive until he saw it crash and burst into flames. Then he zoomed up once more and as he did so the cabin was again raked by the searching bullets from the enemy guns. He came on over in a loop and managed to get the small plane in his sights while he was on his back. Once more he pressed the trips without apparent results. Irene clung gamely to her seat though she had been considerably battered about by the quick lunges of the ship.

He came on over and levelled off, but the second plane was not in sight—it was underneath and rising to the attack unseen. The cabin was again raked by a burst from the guns of the enemy. The little plane was very fast and handled so easily that Roger had little hope of shaking the fellow off his tail. He banked and rolled to no avail. He put the nose down once more and then came back on the stick to start a loop, warning Irene to hold fast. Still he could not shake off that persistent little ship. He reached the top of the loop, then half rolled out, banked around and found that his pursuer was still close on his tail. When he levelled off he saw that Irene was crawling to the rear of the cabin.

"Keep down!" he shouted.

But she paid no attention and quickly reached the rear gun, though a stream of lead was ripping through the cabin, shattering the windows and perforating the steel walls in searching pattern.

The brave girl swung the gun around and found the trip. Her aim was wild at first but she swayed the muzzle back and forth, up and down until the tracers showed that she had found her mark. The ammunition belt was nearly empty and the barrel smoking hot. But a burst of flame came from the pursuing plane and the pilot rose in his seat, terror-stricken at the unexpected result of the girl's desperate endeavor. In a moment he was the center of a flaming hurricane and the plane slipped rapidly downward, carrying him to the most terrible of deaths. Irene covered her eyes as he crawled from the cockpit and jumped, preferring the quicker way to being roasted alive.

"Good girl!" shouted Roger, gleefully.

A few minutes later Roger negotiated a skillful landing on a smooth area he had located in the ice field. They removed the two bodies from the bullet-riddled plane and Roger extracted a packet of papers from Patton's coat that later proved of tremendous value. He determined their position by use of the sextant which he had found in the ship's equipment. From the chart he discovered that they were about five hundred miles due north of Etah and he decided to proceed there for medical attention and provisions.

The wound in his thigh was not serious, the metal-cased bullet from Patton's automatic having drilled the fleshy portion cleanly through, apparently missing the bone entirely. With Irene's help he bound it as well as possible and, though he could scarcely bear his weight on the injured limb, was not seriously inconvenienced.

When they took off, Irene snuggled into the seat at his side with a sigh of relief. It had been very cold outside and the cabin was comparatively warm, though the wind whistled through a hundred bullet holes in windows and walls.

"Poor father," she groaned, as Roger headed the ship toward the south and climbed rapidly. "If we could only have him with us. I shall miss him terribly —we have been constant companions since mother passed away. Now I—I am alone."

She stared dry-eyed into the heavens, suffering mutely as Roger racked his brains for a suitable reply.

"No dear," he finally ventured, "you're not alone. If you will let me, I shall always be at your side. I—I love you, Irene, and want you for my wife."

Then came the tears she had repressed and somehow she found it very easy and very pleasant to move into the protecting embrace of Roger's encircling right arm as he flew the ship left-handed.

She cried out her mingled grief and happiness in the hollow of his shoulder as the plane roared swiftly in the direction of civilization and future happiness. The previous monotony of Roger's existence was never to return and out there over the chill polar floes he visioned happily the contentment and joy that was to be his lot with Irene as his companion.

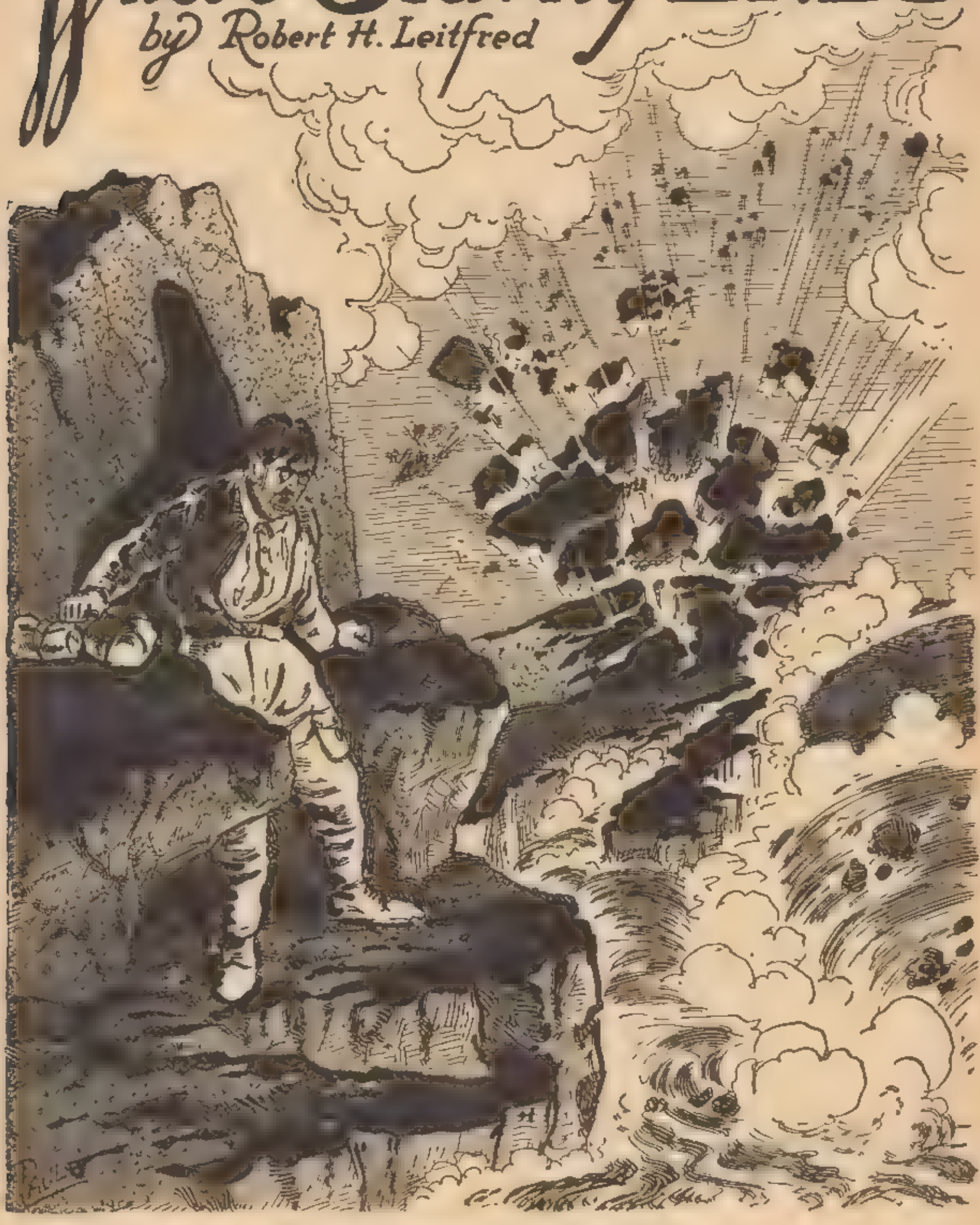
But little did either of them realize that they were to receive the plaudits and gratitude of the world—a world that was to awake to the knowledge of the catastrophe that threatened and that was to find means of stamping out the terrible menace of the Gautamans. For the papers Roger had taken from Patton revealed the whole plot, the identity of the leaders, the locations of the many bases, arsenals—everything. And with this information in the hands of a newly-formed international police it was not difficult to make a clean sweep of the menacious conspirators.

The name of Warren Ingalls lived on, enshrined in the memory of the masses. His sacrifice had not been in vain.

THE END.

Where Gravity ENDS

by Robert H. Leitfred



The noise increases like the booming of a thousand guns. The fissures are opening wider the planet is separatung. I have wedged myself between two boulders to keep from leaving the ground.

THE mechanic gave one last twist to the propeller. A sharp, staccato crackling bit the air as the engine of the giant plane barked out its challenge to the elements; roared still louder, and with a whine that broke into an increasing crescendo, settled down to its stride,—a deep-throated purring that ebbed and flowed from the heart of the engine.

The last adjustments had been made and everything was in readiness on the machine that was to carry Lieutenant Richard Merrill, one of the first American aviators to pilot a French plane, into a country far beyond the borders of France on one of the most dangerous missions he had ever attempted.

With a smile and a careless wave of his hand at the other members of his squadron he climbed into the cockpit and adjusted his helmet. For half a second he fumbled with the strap, then reached for the stick. The note of the engine deepened. A tempest of air swept backwards and the last restraining block was kicked from beneath the wheel.

The plane rolled forward gathering momentum at every yard. An oncoming wind bore down upon it as though to beat it back. The engine's throb answered the singing noise through the fuselage. The wings dipped backward into the teeth of the gale; breasted it, and with a graceful spiral climbed swiftly into the upper strata. Higher and higher it soared in ever-widening circles until it became but a speck in the clear sky—then it was gone.

That was the last that was ever seen of Lieutenant Richard Merrill. The official records now on file in Washington show that he left the French aerial base at Mollincourte on October 13, 1917, under orders to make certain observations. For this work he carried a long range telescopic camera; charts of specific areas to be covered, and a supply of oil and petrol sufficient for twenty-four hours of sustained flight.

At the time Merrill left, I had been employed on the Paris staff of the New York Herald and we had been warm friends. Merrill was one of those men who seemed to spring from nowhere; possessing few friends, and no relatives. He was, and is now, listed as missing. Nothing was ever found of the plane in which he took off on that thirteenth day of October.

For several years following his disappearance the knowing ones argued that the machine had gone far from its cheduled course and had dropped into the sea. Others had pointed out the possibility of its exploding and falling to the earth in flames, thereby making identification impossible. Prisoners had long since been exchanged, bringing back many that were long thought dead. Lieutenant Merrill, however, was not among them, nor was there any record to show that he ever had been a prisoner.

Obviously, then, if the knowing ones were right, Lieutenant Merrill had merely met death in a manner unknown. This might have ended the matter had not something entirely unforeseen developed in the fall of 1919 which enshrouded his disappearance with a cloud of doubt and gave rise to a series of perplexing questions to which I am unable to find sane and reasonable answers.

ROBERT H. [redacted]

Lieutenant Merrill's disappearance forms a chapter of unknown and unpublished experience in the history of aviation. It is a mystery with an explanation but barely plausible even among present day scientists. It fails to conform with the laws of our universe and thus it raises more doubts and more questions.

Briefly, two years after Merrill's take-off from the airdrome in France, a diary written by no other than the missing man was picked up by a farmer in Western Iowa. While the written words of the airman gave a partial explanation of his predicament it also gave rise to a series of perplexing questions. How the book could have reached the earth again while man and machine remained beyond the pull of gravity was a thing that clouded the mystery rather than clearing it.

The diary was wrapped in leather, evidently cut from the Lieutenant's coat, and weighted to a stone. I say *stone* for the lack of a better word to properly define the nature of this peculiar substance. It was in size only a pebble, but it weighed over two hundred pounds. A chemical analysis of a small part of it disclosed helium, uranium, and small quantities of radium. Other metals of unfamiliar origin formed the bulk of the mass. The possession of this curious stone is the only tangible evidence, aside from the diary, that can be offered as proof of the strange adventure of Lieutenant Merrill.

Through the kindness of the local authorities, the book was forwarded to me at the Press Headquarters at New York city, my name having been found on the wrapping.

I am not an astronomer, and my knowledge of our solar system is limited. I do not attempt

IT is conceded by science that the atmosphere of the earth extends only about 600 miles, and even from the 10-mile level on upwards, the atmosphere becomes so tenuous that it would be impossible to sustain human life, even for an instant.

As is well-known, the aviators can no longer breathe comfortably, even at such a comparatively low and dense level as seven miles above the surface of the earth. Without oxygen, therefore, it would be impossible to go higher than seven or eight miles.

If on the other hand, some extremely large or extremely dense celestial body with an atmosphere of its own should come near to the earth, it would not be impossible to have the two atmospheres mingle. Then indeed, it would become possible for an aviator to fly from our world to the other one.

A body made of neutronium for example, which weighs 16,000,000 pounds per cubic inch, need not be very large to have a weight sufficient to attract an object in the earth's atmosphere.

to explain the entries made by this airman in the daily record of his terrible experience. By all means I am not a spiritualist, and I do not believe in receiving messages from the dead. The actual account as written, comes from a courageous man who held on when all hope had been abandoned. If he is now dead, science has lost the key to one of the darkest secrets of the universe. The contents of his diary therefore I am presenting in its original form without comment.

Merrill's Diary

OCTOBER 13. It was some hours after leaving the ground, with the wind swinging past me in mournful cadence, that the first premonition of coming disaster came over me. I struggled to fight it off knowing that it would get me in the end if I didn't conquer it while in the air. To help overcome this fear I fastened my diary near me to record impressions. For a long time my fears were groundless until in the far off haze of distance a tiny speck dotted the thin air. It comes nearer and nearer and I recognize the outlines of an enemy plane. The minutes pass quickly. Soon it is above me, far up. The markings of the black cross are now plainly visible. I recognize it as a German Fokker, and it is maneuvering around to get on my tail. I have set my course on a sharp angle to avoid it and get above it. The pilot of the other machine has started to give chase. Well, let him. I can easily avoid him if I have plenty of room.

The throttle is now way down, and he is no longer gaining on me. There is a cloud bank ahead which I am heading for. Once there I am safe. The air is growing colder with each passing minute. A far off crackling sound is borne to my ears. Tracer bullets burn the air behind me. I laugh lightly and bank sharply to the left. In an instant I realize my mistake. It has brought me closer to the other plane. The whine of steel-jacketed bullets through the fuselage causes me to bank almost vertically to the right. Another fusillade follows. The machine is now climbing like a rocket; climbing faster and steeper than it has ever gone before. A heavy bank of clouds envelopes me and I breathe a sigh of relief. The anxious moments drag. Will the other flyer come through after me?

Above the clouds at last. The Fokker is no longer in sight. I start to push the stick forward and find it immovable. I jerk it with all my strength but the plane refuses to return to a lateral line of travel forward. This is annoying, but I manage to keep my head. Since the plane is headed upward nothing can happen so long as the engine revolves. In the meantime I crawl back to see the extent of the damage. My heart pounds sickeningly. The levers are hopelessly jammed and impossible to get at. One of the control rods is broken. Again and again I tug at the stubborn levers, feverishly now for I realize that if I am going to reach the ground alive I must have some kind of control of the machine.

But all my attemps to straighten the machine are futile. It is climbing steadily upward. Anxiously I recall past experiences for some way out of my dilemma. Nothing suggests itself. I am imprisoned in a hurtling machine which no longer can be controlled. The thought is horrifying. Were it not for this diary I think I should go insane. I have no 'chute with me, and even if I did have I would probably land on the wrong side of the lines and remain a prisoner for the rest of the war.

Visions of past experiences flit before me in kaleidoscopic array. I find myself shivering. The involuntary act brings me back to my senses. It is growing bitter cold. The air is changing and becoming with each minute more rare and it is difficult to breathe. The heavily encased flying suit is keeping my body warm but my hands and face are blue from the cold. I look anxiously at the altimeter. A white frost has formed on the glass panel making reading of it an impossibility. Unable to stand the cold any longer I cut down on the gas. In half a second the plane has started in a tail spin. The swiftness of the descent almost takes my breath away. This will never do. It was death to keep on upward and equally dangerous to fall back to the earth. Between the two I had a choice and took it. I pulled the throttle clear down and kept it there. The plane came out of the spin and once more mounted steadily into the upper void.

Writing has become a dreary task. Blood is pounding in my head and pouring from my nose. I am beginning to feel nauseated and sick. My eyes are heavy as if I hadn't slept for weeks. I want to close them and drift off into a peaceful rest that will at least remove the terror of the unknown into which I am heading.

The earth is now buried with clouds and vapor. I have completely lost my bearings. Still the plane is hurling itself upwards. For the past two hours I have written nothing. With considerable difficulty I have pulled the oxygen mask over my head and attached it to the coupling on the tank. But the pressure is getting lower every minute. The tank hadn't been full to start with. Somebody's carelessness. No matter. It won't make much difference in a little while.

Slowly a heavy drowsiness overpowers me. My will to keep awake is weakening. No longer do I feel the pain in my frost-bitten hands and face. A delightful warmth steals over me. This is the beginning of the end. It's pleasant anyways. I'm not suffering. No longer can I shake off the feeling . . . I'm sinking . . . going down into oblivion . . . farther and farther . . . into eternity . . . I am lost!

October 14. I came to my senses with the sun shining full on my face and burning into my eyes. My whole body aches from the cramped quarters into which I am strapped. A peculiar humming noise fills the air,—a weird, pulsing throb that seemed to soothe my sluggish mind. The meaning of it did not come to me for some time. Then, to my amazement, I find it is the sound of the motor which is still turning over. Strange how curious everything seems. Looking around and over the edge of my seat I gaze into—emptiness. Simply that. As far as my eyes can see, nothing but clouds and the sun.

Suddenly the clouds open up below me and the earth is once more visible, but oh, how far away. I am traveling into the sheer void of sky and heaven. Leaning towards the altimeter which the warm sun has again rendered visible by melting the frost I found the needle stationary at the highest reading on the instrument. Mechanically I note the speed of the plane's travel. During the night it must have picked up considerable for it is now

going close to five hundred miles an hour with no additional effort or strain of power. The wind is singing through the fuselage like the drone of a thousand bees. Faster and faster skims the plane. The air resistance must be practically nil or else the machine is being carried onwards by some invisible trade wind.

I look again at the instrument board. The instruments are all out of kilter, the needles varying from minute to minute. The pointer on the fuel tank shows that I must have been unconscious for many hours. I have no desire for food although I am supplied with a considerable amount of hard tack and several cans of beef. Is this strange buoyancy upsetting my desire for food or is it the result of nerves? I am inclined to favor the latter for my mind seems strangely alert. Impressions are clear and distinct. Yet a kind of a new sense seems to be making itself felt, indistinct and ethereal.

Am I destined by an unkind fate to remain always away from the earth like a separate solar body? The thought makes me laugh aloud. This is folly, I thought. I am dreaming all this. A nightmare pure and simple.

Yet, if it is a bad dream there seems no way of arousing myself. My eyes are open and I can see. Clouds are far below me. I can see the blazing orb of the sun and feel its heat. One by one I examine the dials on the instrument board. I feel of my hands, my face and my heavily clothed body. I hear the exhaust of the motor and the whirl of the propeller. No, I am not dreaming. My senses were never more acute . . .

Beyond the Earth

ALL thought of fear has left me. By now I must be near the last barriers that surround the earth; the edge of the envelope of atmosphere that covers, and in a measure, protects our planet. At the present rate of gas consumption my flight will last but a short time for the gas is low. After that it will be useless to hope for anything to happen. I try shutting down on the throttle and to my astonishment the present speed continues. By some strange phenomenon the plane seems to move along at the same speed regardless of how much gas I give the motor. Here is a point worth considering. Am I getting beyond the pull of gravity? No, it can't be, yet the evidence is clear. This last thought is too much. It frightens me and my hand trembles so that I can no longer write.

It is now evening, or so it would seem according to my watch which by good fortune I have kept going. But there is no darkness,—a strange paradox of nature. I mention this to bring out a striking departure from one of our most natural laws that bring darkness and daylight to the earth every twenty four hours with a regularity that has never been broken. But no, the mistake is mine. It is getting dark but it is hours later than on earth. Yes it is getting darker by the minute.

With the passing of time the air resistance, decreases. In fact there seems to be none at all now. The motor is acting queerly. Evidently the gas is about gone. I don't know what will happen if it stops. Probably nothing at all. In all probability the powerful air current that is carrying me along will continue indefinitely.

In spite of the terrific speed of the machine I suffer no ill effects and breathe quite normally. My body is cramped from being strapped in one position for so long a time and I hesitate to try moving about.

Slowly the hours drag along. I have switched on the light over the instrument board in order to see. After a time I begin to grow sleepy again. The air is slightly cooler. All around me are the stars and to the left hangs a ragged moon.

October 15. I am not sure about my dates for during that awful period that I lost consciousness everything was a blank, but I am trying to keep them approximately straight. Morning has come again, the second morning in the ill fated plane. Hunger returned and I ate sparingly of my rations and washed them down with water from my canteen.

Long and anxiously have I turned my binoculars all about me in search of something to break the terrible monotony of space. After what appears an eternity, I have made out a dark spot that shows directly in the path in which the machine is moving. And so I sit and wait . . . for I know not what.

Gradually, with the passing of weary hours, the spot begins to grow larger. The earth is still below me yet hardly visible through the haze. I gaze again at the rapidly approaching dark spot. What can it be? Is it possible that it is some form of the sun's asteroids, or is it a wandering comet? Once again the premonition of the unreal comes over me. What would happen if I collided with it? I have heard that these strange sky visitors travel at a tremendous velocity through space in their journeys around the earth. But it can't be. Comets and other wanderers of the air are hundreds of thousands of miles from the earth. Perhaps it is but a figment of my imagination. I'll put it from my mind and not think about it.

Alas, the sight of that dark speck attracts my eyes like a magnet. I can not see or think of anything else. I am fully prepared to wait and see.

The afternoon is nearly gone according to my watch. If my present speed continues I should be very near it sometime tomorrow. Ahead of me and a little to the right the great orb of the sun shows. And to the left of it floats the dark body which may or may not mean the end. If I hit it, the machine and I will be smashed to tiny bits. If I miss it, the chances are that I'll continue to travel endlessly into space.

Four hours have passed and I have become exceedingly tired. The speck in the far distance has steadily grown larger and larger. It looms before the path of the hurtling machine like an opening, cut through the sky, leading out of our solar system toward the suns and planets of other worlds. Am I on the verge of a wonderful discovery, or am I seeing a reflected image from a world beyond my sight? Why I should continue to write in this diary I cannot tell. Somehow I feel that it acts as a barrier between me and the great unknown into which I am plunging. It seems to be the one thing that links me to the world I am lost from . . .

I must have dropped to sleep. A curious rocking motion brought me upright to a startling discovery. During the intervening hours, and they must have

been many for my watch has stopped, the machine has sped straight towards the wanderer of the sky, and even now hovers over the dark mass.

Anxiously I peer over the edge of the cockpit and seem to make out hills and valleys, with dark splotches that look like some form of vegetation.

A New Land

THE onrushing air no longer sings past me. I seem to have struck a pocket where force seems of no avail; where all things die through loss of motion; where the laws we call nature fail to hold up. I have passed beyond the borderland of the earth and into the fastness of another world.

For a moment my heart wells up within me at the mystery of the forces about me. Below me stretches a new land, waiting to take me in and give me rest, but never to give me up. Oh, I realize during these moments, as the machine drops lower and lower, that I can never leave this fragment of a lost world into which I am slowly descending. I feel that I have passed the power station of the earth and reached by a long, long flight the one place where ships do not pass; where men never come; out and beyond the invisible line that marks the last world outpost, into interplanetary space where new worlds begin,—where gravity ends!

October . . . Not knowing how long I last slept, I have lost track of the exact date. I think it must be the 17th, but I am not sure. It is hard to describe in a clear and understandable manner my odd experiences during the past few hours. In fact it seems quite useless now that I am totally and forever lost from my fellow men. Words fail to express the terrible loneliness that grips my heart. I feel like an alien soul tossed about in a strange land. And that is precisely what I am.

The plane lies on its side in a small ravine, twisted and broken. Miraculously I escaped unhurt from the fall which, by the way was not as bad as I had anticipated, owing to the small force of gravity this small world had upon the falling plane

I have wondered why the force of gravity did not smash me and my plane to bits. The only conclusion I can reach is that for the greater part of my travel the gravitational force of this little world was almost balanced by that of the earth.

I have eaten and quenched my thirst and stretched my cramped muscles. And now, with the diary still before me I will try to record as accurately as possible, the strange things that exist on this far-away place.

My first experience was in jumping from the edge of the cockpit to the ground. If you have ever seen a motion picture taken with an ultra-rapid lens so that when shown on the screen at normal speed the moving objects leap and fall in a slow and lazy manner, you will understand exactly how I reached the ground. The jump was effortless. It was as though I drifted downward. I started to walk around the plane and found myself continually on the tips of my toes as though I were treading on air. It has become necessary for me to take longer strides when I walk, jumping lightly as I do. The feeling is, of course, exhilarating.

I soon found I could cover an immense amount of ground and still scarcely exert myself. What I took for vegetation proved nothing more than highly colored rocks that upon examination appear to be semi-precious stones. I have, however, found a few flowers unlike anything I have ever seen in my life. They are of a strange, iridescent hue with transparent leaves and stalks. There may be vegetation here but I haven't explored much. The land itself is nearly level, with slight undulations that can scarcely be called hills. I have found a spring of clear water and that is all.

Upon looking over bits of earth and rocks, I find new substances. The stones are remarkable for their luminous quality and quite heavy. I did find one that looked like a sapphire but unlike the usual stones was extremely light. Upon tossing it away I experienced anew the low pull of gravity. I had thrown it lightly and to my amazement it had traveled a hundred yards. I tried the experiment again with another stone of similar weight. This one I threw with some force. That was the last I ever saw of it. It simply floated away in the distance.

Even as I write this, I can scarce credit my senses with a world so small that it seems more artificial than real. It makes me feel that the whole experience is a gigantic hoax and that I shall presently awaken and find myself the victim of a wild nightmare. However, strange as it may seem, it is all too real.

On the top of the highest point I have made a temporary shelter of the rocks; which proved quite simple considering how easy it was to lift huge boulders and lay them wherever I wanted them without any trouble.

Nature is again at work. It is fast growing dark, bringing immense relief to my tired eyes. One by one the lights of the stars shine through the dim vaults from above. They seem very near and friendly tonight bringing me some measure of contentment.

As I stand here in the midst of immensity looking out into infinite space, the vision appals me. Across the clear terrestrial sky are multitudes of glittering lights, faint and effervescent,—the twilight of other worlds. These, then, must always be my companions—my one solace on this far-off fragment of a broken world.

Nearing the End

ANOTHER day has come I have put off the depressing thoughts of last night and begun a systematic survey of my new home. If I am to remain here I must be prepared for a long stay. From what observations I have made and my poor knowledge of mathematics, I should judge my little planet is but a few hundred miles in diameter. From what I can conclude from my knowledge I believe life is possible as long as the planet remains in its present orbit.

Until early evening I pondered my chances for continued existence in this remote place since it is clearly impossible for me to return to the world of war and men. War! I had forgotten it. How far away it seems now. My uniform, the silver bars on my shoulders, my commission as a lieutenant in the aviation, I'd trade them all for a good cup of coffee.

I had just finished the last entry in the diary when a sudden shuddering jar as of a head-on collision shook the planet. It is hours afterward now as I write. How many I cannot guess. Vio-

lent subterranean action is fast shaking my stronghold to pieces!

The ground is opening up in black, twisting seams from which a choking, gaseous vapor is coming out in strangling clouds! A flash of violet-hued fire followed closely by a thunderous rumbling roar causes the tiny planet to lurch violently on its axis. The ground is heaving and trembling from some inward strain. A blinding glare of vivid lights followed by a crunching as of earth and rocks being slowly pulverized from the powerful forces beneath, marks the beginning of the end. I can feel it in every fibre of my body. How I can remain in one position and write I do not know. Running away will do no good. All I can hope for is to keep my head and observe something that no mortal has ever before seen.

The noise increases with each passing minute. It is like the sullen booming of a thousand guns. The fissures are opening wider. The planet seems to be separating. Each passing moment finds the air more oppressive. Clouds of vapor hover close to the ground. All the lighter forms of mineral are fast being precipitated off and outward from the whirling, tumbling mass into space. I have wedged myself between two enormous boulders to keep myself from leaving the ground.

The rumbling, deep and thunderous, is shaking me so that I can hardly write. Overhead, the air is filled with flying missiles being thrown into space. Complete and instant destruction is not far off.

Flashes of scarlet and green are breaking with the violet. Coughing and strangling from the poisoned air I am beginning to grow weak. I am writing my last few words for the outside world in hope that they will fall into the hands of someone who . . .

The ground is disintegrating beneath me . . . it is melting . . . scorching blasts of flame are shooting skyward. No longer can I . . . God help me, the rocks are running like molten wax . . . it is burning me alive . . . Merciful God . . .

So ended the diary of Lieutenant Richard Merrill, —a strange and unbelievable document of human experience. From the Paris morning journal. *Le Matin*, I have cut out a clipping that appeared on the morning following the fifth day of his disappearance.

STRANGE SKY VISITOR GONE

On October 12th, a new and unknown sky wanderer was observed low on the northwestern horizon. Its approach to the earth was so close as to seem almost a part of it. The comet or asteroid was visible but a short time on two evenings. That it escaped general notice was due to heavy clouds that hung in the sky about it. Sometime later, a process of disintegration was plainly observed in the early evening. When next looked for, no trace of it could be found.

This item of news had no particular significance at the time to anyone. It received merely a passing notice in a few papers.

The appearance of the visitor and Merrill's disappearance may be but a coincidence. But, if this astronomer's report is true, the coincidence is startling and lends a certain actual proof to the strange scrawled words in the unfortunate man's diary.

THE END.

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Be sure to read these wonderfully illuminating and prophetic articles.

Don't fail to read the announcement on page 286 of this issue.

The Ark of the Covenant

We lay over Wall Street; and the gondola was lowered, telephone communications giving us directions. We had strewn bombs all about the district so that gas clouds wreathed in the streets.

What Has Gone Before

A series of daring robberies has startled America. Three Wall Street banks have been robbed of millions in gold by a mysterious ravager and the financial district put to sleep. An ocean liner is also robbed of gold and later a bank in Louisville, by James Boon, an inventor of a new airplane, and son of one of the New York bankers he mixes interested in the mystery and interests his friend Dan Lamon, a scientist. They conclude that the raider operates from a great speedy airship.

Boon has made the acquaintance of Almeric Pluscarden, deputy governor of the Bank of England and his pretty niece, Kirsteen Torrance, on the night that his father flies Pluscarden back to England in his speedy airplane the MERLIN. The Bank of England is robbed by the tornado, millions in gold stolen and the ledgers destroyed by acid. Soon comes news of the invasion of the Reichsbank in Berlin, where securities and ledgers were destroyed and a few hours later the Bank of France is entered and millions in gold is left there as well as a supply of radium.

As always the district surrounding the robbery is filled with a gas that puts people to sleep and has the ability to tarnish gold. It also has the quality of stopping the action of gasoline engines. In the Paris invasion the first sight of the robbers' ship is had, a gigantic airship, which as per no local relations must have an amazing speed.

Believing that the world is faced with a reign of terror from the robber or robbers, Boon returns to America to arouse his country to fight it. He sees the President who gives Kirsteen Torrance a secret service rank and with Dan Lamon is commissioned in the Secret Service to hunt the robbers. Hearing of robberies off the coast of Africa they start out with a plane equipped to fight the raider and after much searching meet him. But their bullets do little harm to the airship which is surrounded by a haze and the plane's motor goes dead. The airship, which calls itself "The Ark of the Covenant" escapes. They believe that it has its base in Morocco and call upon the nations to concentrate their airfleets there.

CHAPTER XI—*Continued*

Futile Searching

IN answer to the radios we sent from Mogador, the international scouts came flocking to the African coast. Indeed, we were no sooner at the place than the forerunners of the crowd came after us, brought along by the news of our fight. They came in a big fan-shape move that in my opinion must inevitably have caught the airship had she doubled back across the Atlantic.

VICTOR MacCLURE

There was little doubt in my mind, after sizing the thing up with Milliken, that he and I had done some damage to the airship with our shellfire. We had put in enough stuff to have fired her if hydrogen had been used in her ballonets, so it was pretty clear that her lift was got from helium. In the face of the amazingly quick getaway the raiders had made after the engagement, this was puzzling.

From her length, which Milliken and I agreed was about two hundred metres, and from her other measurements, the total fixed weight of the ship was somewhere round thirty-four thousand kilos. Using helium, she could not have a disposal lift of much more than perhaps fifteen thousand. When the weight of her crew, fuel, and armament was taken into account, not much margin was left for carrying extra gas in liquid form. So we reckoned that our puncturing of her must have caused a lot of leakage, and that her spectacular ascent must have exhausted a good portion of her reserve gas. We concluded from this that she could not have had far to go to her base, and that she would have to travel ultimately at a low altitude, which made it unlikely that the patrols making for the African coast would have missed sight of her, had she been making across the Atlantic. Altogether, the three of us worked it out that we were justified in believing the airship to be concealed somewhere in the hinterland of the Barbary Coast and that she would venture out again when the damage we had done to her was made good.

We in the *Merlin*, with numbers of the international scouts, worked on this notion and ventured far into the desert, but without finding any reward for our searching. A cordon of scouts was flung round the coast from the Canaries right into the Mediterranean.

On the Wednesday following our fight with the airship, radio messages were picked up that told of raids on shipping to the north of the Bahamas. The temptation then was to go chasing off in that direction, but we held back, pinning our belief to the idea that our particular airship was berthed somewhere in N. W. Africa, and that it was only a matter of patience before one or other of the planes round the coast came upon her. Personally, the news of the raids in the western Atlantic only confirmed my belief that the organization was big enough to have bases on both sides of the hemisphere.

We lay on and off the coast of Africa for ten days, without any luck, and for several reasons I made up my mind to make for home, *via* London. First, I wanted to see Sir Thomas Basildon, with whom we had been in constant communication since leaving Washington. Dan had sent him a long report embodying his ideas of the means used by the raiders for upsetting the engines of attacking planes, and outlining a possible way of circumventing the strange weapon. Already Dan's assistants in New York had drawings of a protective arrangement designed for the *Merlin*, and I was anxious to give the thing a trial and to have it tried out on other machines. It was an elaborate cage arrangement of metallic conductors leading to a series of condensers, and it was meant to collect the supposed electric ray before it reached the engine and to disperse it harmlessly. In the matter

AS we come toward the final chapters of this greatest air story—in our belief—that has been printed so far, we are approaching the best part of the story.

We are quite certain that the denouement is quite different from what you expected. And when you learn the amazing secret that lies behind the mysterious "Ark of the Covenant" we believe you will applaud the author for the wonderful idea it is based on—making the world a better place to live in.

And let no one think that the scientific instruments which the author uses are either improbable or impossible. Sooner or later, we will have the weapons so finely conceived by him and we do hope when we have them that the inventor or inventors who bring them into the world will take as lofty attitudes as "The Chief."

of the gas, however, by some unfortunate mischance in landing, whether by a wave or otherwise, Dan's bottle apparatus for sampling the anæsthetic had been smashed on the day of our fight, and he was without a sample for analysis, much to his and my chagrin. Secondly, as a reason for going home *via* London, I had heard that Lord Almeric was intending another visit to America, and I thought if he could make his arrangements suit it would be a good notion to take him over on the *Merlin*.

I radioed to Sir Thomas telling him to expect us, and on the Thursday evening Dan and I were closeted with him and Lord Almeric in the room at Scotland Yard.

The chief of the British C. I. D. had not wasted any time, we found. He had badgered the authorities into fitting up his planes with airtight bodies and supplying them with oxygen, and he had had instrument-makers set to the task of turning out Dan's protective apparatus. Our discussion with him, and our description of the fight, helped to clear up some points that had been puzzling him. We came away from Scotland Yard in the knowledge that our visit there had not been a waste of time.

From Lord Almeric we heard that business in Britain was at a standstill, and that factories and commercial houses were closing down all over the country. Prices in the stock markets were lower than they had ever been, good industrial securities which had been regarded as next to gilt-edged being sold at prices that made them look like wild-cat oil stock. The damage to the country in lost trade represented millions, Lord Almeric declared, and the set-back would be felt long after the raiders were scotched. The state of affairs was out of all proportion to the damage done actually in the raids, and could only be attributed to a kind of panic.

As a result of the London raid and of the affair in the House of Commons, the government had fallen. It had been laughed out of office, though ostensibly its fall was due to a defeat on some quite unimportant measure. The press devoted columns to the raids now, and printed the opinions of wise men, foolish men, well-known men, obscure men, of how the outrages were carried out and how they could be stopped, with fantastic theories on both sides. It was even suggested that the raiders had come from Mars. The change of tone from the time of the New York raid was, to say the least of it, remarkable.

Unobtrusively as we had made our entry into London, neither Dan nor I nor Milliken escaped the attentions of the newspaper men. They hung round us like flies, infesting our vicinity at meal times, seeing us to bed and greeting us on our awaking. We were glad when at last on the Saturday morning we could get Lord Almeric aboard and be off across the Atlantic. We made straight for Washington, where my passenger was to meet my father and several other bankers. Our voyage was quite uneventful and placid, and we arrived on the Potomac basin just before seven on the Saturday evening, American time.

A Rival

IT was good to get back to Washington and find not only my father but Kirsteen Torrance waiting for us on the landing-stage. Four weeks, all but a day, had elapsed since our setting out on our venture, and, to me at least, a shadow of failure lay on our return. At any rate, I was a little shy of meeting Miss Torrance's level glance. There was that in her welcome of us, however, after she had greeted Lord Almeric with affection, which quickly swept away all sense of having failed. To Milliken, always her favorite, she had so much to say that he was at his blackest of countenance with embarrassed delight. I thought he would burst something.

The old man, too, seemed to think we had not done badly. In the casual heartiness of his greeting, I thought I could discern something of satisfaction—of pride, even—at our exploit.

Dinner that evening at the White House was a sort of reunion. The President, Kirsteen, Lord Almeric, my father, Danny, and myself, all somehow linked up with the task in hand, composed the party—and one stranger. This was an Englishman, a big fellow named Seton.

Now in the four weeks we had been away from Washington I had thought a good deal about Kirsteen Torrance, and I may admit here and now that I had come back to her with an absolute certainty that life without her would for me be incomplete. When the *Merlin* was streaking down on the airship that Sunday morning, it had come to me very clearly just what Kirsteen stood for—and that was pretty nigh everything. I won't elaborate on the theme. I'll leave it just so.

It was with a pang of dismay, therefore, that I heard Commander Seton introduced as an old friend of both Kirsteen and Lord Almeric, and saw the satisfaction the big Englishman and she had in each other's company. When a fellow finds a girl interesting, there's nothing can make him feel so hopeless about his chances with her as to hear her talk with another man, "Do you remember—?" bulking largely in the conversation. Seton and Kirsteen were old enough friends for that.

It would have been a mean thing to get up any dislike of Commander Seton. As he listened to the story that Dan and I had to tell, it became very evident that the stranger was no layman in the matter of aeronautics. His comments were practical to a degree, and his questions shrewdly knowledgeable. Not only that, but under the lethargy which sometimes is to be seen in big men of his sort, there lay a mental alertness that promised he could move his big frame with lightning quickness in an emergency. He gave an impression of being very much a man.

The only point that Dan and I held back from the general company was regarding his idea for getting round the electric ray of the raiders. I can't say what it was that moved us to this piece of reticence, unless it was just the presence of Seton. But this was the very point that the big Englishman brought up later in conversation with me, when Kirsteen had brought us together, saying that we should find much in common.

"That is a curious fact about all four machines being sent down with engine trouble, Mr. Boon," said Seton. "It seems indeed to point to some weapon of the kind imagined by your friend Lamont."

"Yes," said I. "The raiders themselves knew our engine would be all right afterwards."

"Makes it conclusive."

"Yes," I said shortly. "Are you remaining long in Washington, Commander Seton?"

"It depends very much on circumstances," he replied. "If the raiders have such a ray, it makes them practically immune from airplane attacks."

"Practically," I agreed. I wanted to leave the subject.

"Except, of course, from a surprise attack on a

vulnerable point from a height."

"Oh, yes," said I. "There's always that. It must be obvious to you as an airman——"

"Ah," said Seton, "you know that about me, do you?"

"I guessed it. Ordinary people do not talk of 'torque' as you do."

"Come, come. A common engineering term like that——?"

"Aren't you, then?"

"My dear man, I have never concealed it. If I did, there would always be *Who's Who?*—and the British Navy List to give me away."

"Fly much these days?"

"A little—but I still retain an interest in the game," Seton said. "I am very interested, for example, in this new machine of yours. From all accounts, she must be a wonder."

"She's pretty good, I'll admit," said I. "Come and see her some day."

"I should like to very much. What day would suit?"

"To-morrow if you like. We go to my place on Long Island for a refit, but you could see her before we start. Where are you staying?"

"Hotel Maryland—like yourself."

"Then you could come down with me to-morrow."

"Splendid," said he. "I want to see her, especially as she may be the last of the airplanes."

I looked at him with some amazement.

"How do you get there?" I asked.

"I mean the last of the fighting airplanes," he explained. "If these raider johnnies have the ray you imagine, and unless some means of protection against it can be devised, the aeroplane will be of no use. Think of dirigibles attacking a town—with bombs—and crashing all machines sent up against them. Their power would be unlimited. But perhaps you and Lamont have devised some means that may make the rays ineffective?"

I looked him straight in the eyes—and lied.

"No," I said, and turned to find the President coming over to me.

"A minute, Jimmy," said the President, "if Commander Seton will excuse us. I have been talking with Dan Lamont about that protective cage idea for these rays——"

I got up with a look at the big Englishman. He was smiling blandly, and he shook his head at me in a way that made me feel very small, for I did not know why I had fenced with him all along, to lie to him at the finish.

I saw little of Kirsteen that evening. People drifted in later, and between these, her uncle Lord Almeric, Seton, my father, and Danny, she was kept too busy to spare more than a brief moment or two with me. It was from Lord Almeric that I heard Seton's history.

Ready for Action

COMMANDER SETON had done well for his country in the war of 1914-18, and had come out of the struggle with a string of initials after his name, representing the highest honors the Allies and Britain herself could give him. He fought as a sailor and as a flying man, and in the latter branch had handled both aeroplanes and dirigibles. Towards the end of the war, he had gone back to sailoring, and had finally retired with the rank of commander. He then took up business in London City, and in the years had amassed, it was said, a fortune of half a million British pounds sterling. With this behind him, he deserted the City and began to indulge a passion for exploration, often being absent from England for months on end. He was now back, Lord Almeric thought, after over a year's absence.

Seton came to see us off to Gardiner Bay on Sunday afternoon, and he had great praise for the *Merlin*. He was the only airman who ever inspected the machine who grasped the principle of the hovering arrangement straight off. There was something about the big fellow that moved me to a sincere admiration of him, but I did hate to see him standing with Kirsteen as we flew off. I knew it would be days before I could get back to Washington, and I was leaving him a clear field with the girl.

Still, I had my job to do, and in the face of that, personal matters had to stand aside. We had to fit the *Merlin* up with Dan's apparatus, and go over every screw and pin of her. She had been flying for over a month with no more overhauling than Milliken and myself could give her, with the help of chance mechanics. She was due to be taken down and set up again by men who understood her, if her high efficiency was to be maintained.

We put Dan ashore at the Battery landing-stage on the Sunday evening, so that he could go straight to his laboratory, then we went on to Gardiner Bay, where we found every man jack of the workshop hands waiting to see us arrive. It was their day of rest, and since our departure they had been working at top speed on the making of machines from the *Merlin* design, but the boys had always been keen. They were more than just paid hands. Anyhow, the cheer that went up when the old *Merlin* came to rest by the jetty might have been heard in New York. Nothing would suit them but that I should tell the whole bunch of them, collected in the erection shed, the full story of our toss-up with the airship.

On the Monday, Dan Lamont turned up with two intense-looking assistants and a carload of materials. We handed over to the three of them a small drafting-office, where they immediately became happy in an outrageous tangle of wire and blue prints. I told Dan I thought they were a messy gang, but by the time we had the *Merlin* overhauled and waiting to be put together again, he and the solemn pair were on the mat with a neat cage affair and a string of black boxes, all ready for fitting inside the engine cover. By Thursday evening we were prepared for our second sally against the enemy, and I had great hope that Dan's fixment would give us a better fighting chance.

We arrived in Washington early on the Friday forenoon, and almost the first person Dan and I met there was Commander Seton. We ran into him in the foyer of the hotel.

"Hullo, Boon! Hullo, Lamont!" said he. "You're just the very men I was hoping to see. I'm off for the south at three o'clock, and I want you to lunch with me. Miss Torrance is coming, and Lord Almeric, if he can get away."

"Why, sure," said Dan, right off. "Very glad to——"

"Delighted," I said. "Where and when?"

"In the hotel here, at one o'clock."

Dan and myself went off to see the President and some of the officials who looked after affairs connected with the raids, and at one o'clock we found Kirsteen and took her to the hotel. Lord Almeric sent his ex-

cuses. Talk at lunch-time never seemed to be far from the raiders and our venture.

"I wonder," I said, "just what the game is—the big idea behind the raids?"

"What's wrong with asking?" Seton asked casually.

"Asking!" said I. "Asking whom?"

"Asking the raiders," he replied.

"Christopher!" said Dan Lamont. "Funny nobody's ever thought of that!"

"They have wireless, haven't they?" Seton went on. "It should not be a matter of great difficulty to ask them what they're up to. Why don't you?"

"I will," I said. "Or see that they're asked, anyhow."

An Attack on Washington

SETON left Washington at three, and Lord Almeric joined us to see him go. He was going to New Orleans.

"Good-bye, Boon," he said to me, last of all, and gave my hand a grip that nearly brought the blood out under my nails. "I have a feeling that we shall meet again, quite soon."

"How's that?" Kirsteen broke in. "I thought you were leaving America, Jumbo?"

"Well, what of that?" laughed the big Englishman. "Can you say in what part of the globe an ubiquitous fellow like Boon will be three days hence? I shouldn't be surprised to see him turn up with his machine in Timbuctoo."

"Timbuctoo!" I said. "Is that your destination?"

"Timbuctoo! Lord, no! I only mean I have a hunch we'll meet in the most unlikely place sometime."

That evening a message in the name of the President of the United States was broadcasted on the wave length used by the mysterious airship:

To the Airship *Ark of the Covenant*: With what object are these raids made on humanity? B Whitcomb, President of the United States of America.

Stations all round the Atlantic shores, on our side and in Europe, took up the message and repeated it. Every three hours the message went out. Saturday came and passed. Sunday passed. And still the message was repeated.

News of the President's message germinated from a chance remark at a luncheon party, got into the newspapers. It was featured with staring headlines, and the people waited in breathless expectancy for the reply, for most of the journals promised a special edition immediately the news came through.

Danny and I waited that Sunday night in the White House, while Milliken stood by with the *Merlin*. Midnight came, and the President still stubbornly believed that the message would come. I thought of going down to the basin and turning in on my boat, ready to take the air as soon as the word came through the aerodrome radio. But Mr. Whitcomb would not hear of it. There would be no delay, he promised us, and if we cared to sleep he would have the servants make us up a shakedown apiece. But I was not thinking of sleep for myself. I was thinking of sleep for the President, and for a too-heavy-eyed Kirsteen who shared our vigil.

Now, I would have the situation realized to the full. Every radio station on the shores of the Atlantic waited for the message that might come from the raiders, and every one would take it with the directional detector open. It was a trap of sorts. Some hundreds of stations would pick up the message, and behind these stations planes lay, ready to take the air to the place whence the message emanated.

It was too much to hope that the raiders would reply from a base. None would know better than they the danger that lay in doing so. But it was hoped that their known daring would tempt them to reply from the airship, not realizing perhaps the extent of the secret preparations that had been made for their next appearance. It might chance that they would reply from the middle of an encircling ring, which would at once close down on them.

One o'clock on Monday morning, and still we waited. The hand of the clock slowly crept round to the half-hour, and the chimes belled out half an old Lutheran hymn tune. The vibration of the last unsatisfying note still hung in the air when a knock came to the door. It was a messenger with a radio flimsy in his hand.

"I'll read it aloud," said the President. "God bless us and give us mercy! Listen!

"Relayed from the U. S. S. *Pershing*—Message begins—Regret to report total company of the ship rendered unconscious between the hours 23 Sunday 1 Monday. Following message found in radio cabin addressed to President Whitcomb—quoted message begins—To the President of the United States of America from the airship *Ark of the Covenant*: To stop War!—Quoted message ends—Position 39° N. 73° W.—relayed message ends."

A gasp went up from our little company. Then silence.

"To stop war!" the President repeated at last. "A worthy object indeed! Piracy, robbery, the world's commerce and trade brought to chaos—to stop war! What visionaries, what madmen are these?"

"Shrewd madmen!" I exclaimed. "By this time they are six hundred kilometres from the position of the *Pershing*. We might have known!"

"Not peace, but a sword!" breathed Mr. Whitcomb. "Peace by terror—panic in the night!"

I darted for a chart that lay on a table near by. "Thirty-nine degrees north. Seventy-three degrees west!" I cried. "That's near home, if you like. Three hundred and fifty kilometres due east of this city!"

"Up after them, Jimmy!" cried the President. "Beat the skies for them! Bring them down—!"

I put my hand on my flying-coat which lay on a couch handy, and Kirsteen ran to help me.

Just then, through the open window there came a wild shrilling of whistles from the streets of the City, a hubbub and shouting. Transfixed, I stood with an arm in one sleeve of my coat, the body of it hanging loose in Kirsteen's hands, and she by my side, staring at the window with the rest of us.

A faint explosion came from the grounds outside—like the bursting of an electric bulb.

"Quick!" I shouted. "The window, Danny! Shut it quick! Kirsteen—Mr. Whitcomb—upstairs as fast as you can! To the roof!"

But even as I sprung for the door of the room, I saw first Danny succumb to the gas, then the President. I was just in time to catch Kirsteen, swaying, as she fell. By dint of holding my breath, I managed to lower her gently on the couch—then my overwrought lungs gave way.

I sprang from tall cliffs . . . into a balanced dive . . .

down . . . down . . . into depths that were dense indigo. . . .

The Raiders' Answer

FROM gross darkness I swam upwards, with a sense of well-being. Into a cavern of deepest blue, through cerulean and emerald, into pearly grey and primrose I swept upwards, to wake with a strange exhilaration in a blaze of light. . . .

Somewhere near me clock chimes belled out half an old Lutheran hymn tune. . . .

I found myself huddled at Kirsteen's feet, as she lay inert on the couch in the President's sitting-room. Some one had thrown my flying-coat over her. By the window, now closed, lay Dan Lamont, and nearer the middle of the room, with his head comfortably disposed on a pillow and with a rug thrown over him, the President reposed.

Remembering, I got unsteadily to my feet, and as I looked at the clock and saw that it marked half-past three, my first thought was for Kirsteen. I took her hand and patted it gently. She did not stir, and I half strangled with a fear that she was dead. But she was breathing softly, and I left her to cross to the President. He awoke at my touch.

"What?—what?" he muttered. "What was that noise in the garden, Jimmy?" I helped him to his feet. "I remember now. The raiders!"

"Yes, sir," I told him. "We all have been asleep for two hours."

He went over to Kirsteen in a dazed way, while I crossed to Dan Lamont. The President shook the girl softly by the shoulder, and as I knelt by Danny I saw her wake with a smile. I shook Danny.

"I wasn't smart enough, Jimmy!" he muttered "It's too quick, that dope—doesn't give you a chance."

I helped him to his feet.

"Gee, Jimmy!" he said with a faint grin. "We've been raided!"

"Looks like it."

I turned to the President and Kirsteen, and found them standing by the table in the centre of the room. On the table lay a paper.

"Boys, come here!" the President said, and all four of us stood by him to read the message that lay before him.

> Benjamin Whitcomb [it ran].
>
> You ask us what object we have in making these raids on humanity. Here is our answer once more:
>
> We make these raids on humanity for humanity's sake. Our object is to put an end to war on humanity. If you, as the honest man you are known to be, have a real love for humanity, you will use your power and influence to further that object, by whatever means you think fit.
>
> None knows better than you know how near the nations stand to the brink of war. Until they resolve to step aside from the path that leads them to destruction, our power will be used against them on land and sea.
>
> If you have eyes to see, you will see. If you have a tongue wherewith to speak, you will bear witness to the nations.
>
> That is our answer, Benjamin Whitcomb. Look to it that you answer as straightly.
>
> THE LEAGUE OF THE COVENANT.

"The madness of it!" muttered the President. "Do they think that nations can be reformed by the turn of a hand? And yet—the bigness of it! Man, man—if I were only foreman to God Almighty——"

He broke off and paced up and down the room.

"It is a great object if sincere," he said, as if we had not been there, "but these are not the means to accomplish it. Will earthly fear drive out that sin which not the fear of God can subdue? No, no! No wrong can right another. It is a menace—a menace. It has brought the peoples nearer to war than further from it. It is a menace."

He turned to Danny and me, but though he looked at us with blazing eyes, he seemed to see beyond us.

"I will not turn back," he said thickly. "Your task remains, James Boon. Find me the nest of these visionary pirates, and let us test their boasted powers, these evangelists who do not scorn to fill their pockets as they preach. Roust me them out, James Boon. You have behind you the whole of the United States. To it, my son!"

"Yes, sir," I said quietly, for I saw with surprise that he was not himself. "Good-bye, sir!"

"Good-bye, Jimmy. Good-bye, Dan."

He turned to finger the paper that still lay on the table, while Kirsteen came with us to the door.

"Don't leave your uncle, Kirsteen," I whispered. "He is not himself!"

"He is better alone," she replied. "He is so terribly self-willed that he hates being dictated to, and he is mad with anger at the indignity of having been sent to sleep. But he's right. The raiders must be caught and punished. Good-bye, Dan. Good luck!" She held out her hand to Dan, who grasped it for a moment, then ran down the steps. "Good-bye, Jimmy. God speed you!"

I retained her hand for a moment.

"Kirsteen!" I blurted. "I caught you as you fell. I know I can't do without you. Is there any chance for me?"

"Jimmy, Jimmy!" she said gently. "You have a man's task before you yet——"

But there was that in her voice made my heart leap. I laughed, and stopped to kiss her hand.

"Well," I said, "it's a man's task to tell a girl he loves her."

I ran down the steps after Dan.

CHAPTER XII

Milliken's Theory

AS we made our way down to the basin on the Potomac, Dan Lamont and I came on a number of people still lying unconscious from the gas. They were at about the end of their sleep, and the night was warm and mild, so they could not come to much harm. We did not stop, therefore, to attempt to bring the sleepers round.

At the landing-stage everything was placid and quiet. The arcs were burning brightly, and by their light we could see mechanics walking about or working here and there. Milliken was fast asleep in the *Merlin's* cabin, and when we woke him we found that no news of the raid had yet reached the aerodrome. The message to the President had been picked up by the radio, and on receipt of it several pilots had gone up to make for the position given by the *Pershing*.

"I thought it was a bit like shutting the stable door, myself," said Milliken, "seeing that the radio arrived over two hours after the doping of the battleship. When you didn't turn up, I thought to myself that the plan had been changed, and that you were after some other game. So I just turned in and had a sleep."

"While you were sleeping, Milliken," said I, "Washington was being raided.

He sat up at that.

"Jinks!" he exclaimed. "There wasn't a whisper of it round the aerodrome."

I turned to Dan.

"Looks as if the folk that made the hubbub and blew whistles just before the gas caught us must have been doped, too," I said.

"Looks like it," Danny replied. "It's a clean get-away!"

Milliken stared.

"What? Were you doped, then?" he asked.

"Yes. The attack was on the White House. The President and Miss Torrance were put to sleep."

For the first time in my experience of him I saw Milliken grow really angry. The blood rushed to his face until it was black.

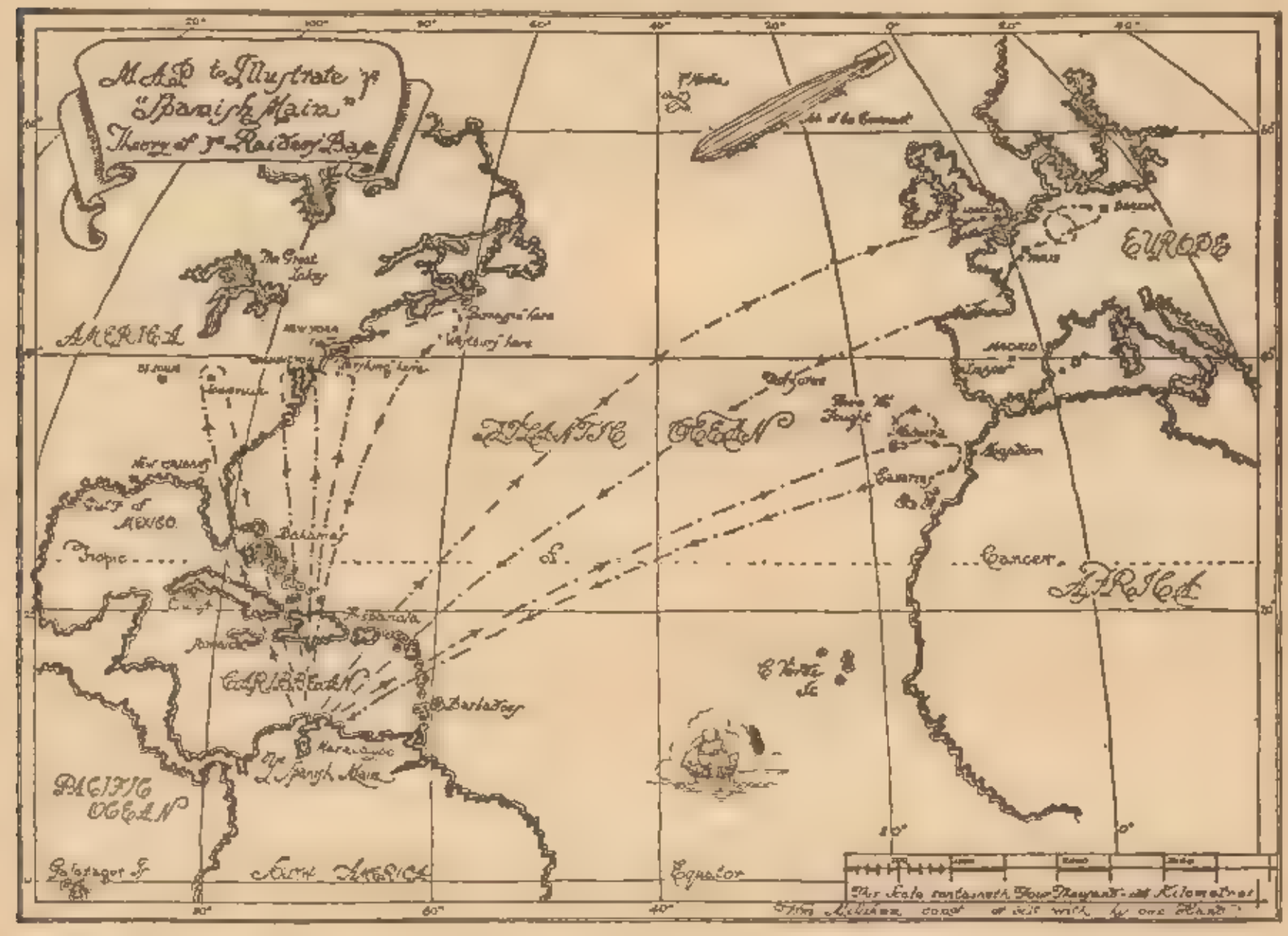
to the *Merlin*, but still fair enough for an airship. Look at this morning. Six hundred kilometres in two hours!

"There's legs for an airship," Milliken insisted. "Here, Mr. Boon—and you, Mr. Lamont—just have a look at this. This map. I figure it like this——"

He had dived into his locker and brought out a small scale map of the Western Hemisphere. On this he had drawn a complicated series of lines, carefully tagging the longitude and latitude of each known raid. It was an interesting piece of work, and it showed that old Milliken was silent to some purpose if he thought the more.

"What do you think of it?" I asked Dan.

"Christopher!" said he. "I think Milliken's got a



"Miss Torrance!" he choked. "Here! C'mon after them!"

"Easy, Milliken," I checked him gently. "We don't know yet which way the raiders have gone. I had hopes that the aerodrome knew of the attack, and had some idea of the direction they took."

"Not a scout went up, sir, on account of the raid," he said thickly. "If I'd only known! I'd have given them something—the swine! Dope a girl like Miss Torrance, would they?

"Look here, Mr. Boon—Mr. Lamont," he went on presently in his normal voice. "I've been thinking this thing out in my own way. I've been studying the map a bit, and calculating distances and that. I've worked out times, too. From what I saw of the airship that day, I'm betting she has a fair pair of legs—not up

hot idea. Good for you, Milliken!"

We went over the theory carefully once more, checking Milliken's figures. The idea was more than feasible.

"You're betting, then, Milliken, that the base is somewhere on the Spanish Main" I said to him.

"The Spanish Main!" he cried. "Why, so it is! I never thought of it so—but so it is! Now wouldn't that be just the place for the dern pirates?"

It was obvious that the romantic associations of the old name had fired the imagination of Milliken, but that did not affect the attractiveness of his notion. A feature of it was that he had worked the whole thing out on the basis of one airship. I thought this point a trifle stretched, myself. It was giving the airship of the raiders a power that was simply miraculous, but

even worked out on the basis I held to, that the raiders had stations on either side of the Atlantic, there was a good deal in the idea. I slapped my mechanic on the back, anyhow.

"Good enough, Milliken," I said. "We'll head south for a start!"

When we flung open the gates of the boat-shed, and floated the *Merlin* out into the basin, we found that the news of the raid had got down to the air-station. It was now a scene of wild activity. From all directions came the hum of engines, and mechanics were running about on all the platforms. When the *Merlin* appeared in the open, we were immediately surrounded by pilots and squadron commanders asking for the latest news. Their news was more up-to-date than ours, and we did not waste time in telling them how we ourselves had been doped. Nor was it necessary to inform them of Milliken's idea. They were all under the central command, and the information would only have made them restless. We left it alone and got ready to take off.

"Where are *you* heading, anyway?" some one shouted, as we swung into the beam of light which gave us our path into the wind.

"Us?" I yelled in reply, with a strange feeling of exhilaration. "Why—we're heading south! Contact, Milliken!"

Off to the Spanish Main

TO the hum of the engine the *Merlin* throbbed, and as my mechanic climbed up through the hatch, we lifted from the surface of the water and climbed, swinging south for the old Spanish Mainland.

It was after four in the morning when we took off from the basin, and day was breaking as we reached flying height. Less than an hour's flight left Cape Lookout behind us, and shortly after seven we were over the Bahamas. The mass of Cuba loomed up on a clear horizon sometime past eight, and by ten o'clock Dan and I were breakfasting in one of the best hotels in Kingston, Jamaica. So it may be guessed in what trim the *Merlin* was that morning.

Milliken had relapsed back into his usual taciturn self, and would not be persuaded to join us at the hotel. He preferred to remain behind with the *Merlin*, and cook his own breakfast on the gasoline stove. I fancied he was a little astonished at his own eloquence in the early morning, for he was certainly piling up a new record for silence. He woke up enough, however, when we rejoined the *Merlin*, to plead that we make straight for Maracaybo, so redolent of association with the Buccaneers. I had had another notion than to risk the probable discomfort of the Venezuelan town, but I decided that Maracaybo would do for a start, especially as it satisfied some hidden vein of romance in my robust artificer. Let the reader examine Milliken's map of the North Atlantic at this point, and learn what a curious fellow my mechanic is.

"Maracaybo be it!" I said to him. "And let's hope your hunch leads to another slap at this modern Morgan!"

We crossed the Caribbean without mishap in good flying weather, and made Maracaybo an hour after noon. The town has a good harbor, part of the land-locked Lake of Maracaybo, excellent as a shelter for seaplanes—but for reasons, which have much to do with a personal bias to that virtue nearest godliness, we decided to sleep on the *Merlin*.

We had filled up with gasoline at Kingston, and had sufficient aboard for a fairly long flight, but it is always a wise plan to keep full tanks if good stuff is to be had. Here we found some difficulty. The stuff the dagoes were willing enough to supply would have been too much for the digestion even of a three-thousand-kilo truck. I was for letting the thing slide until we made another port, but Danny came out with a suggestion.

"What's the matter with trying old Aunt Mandy again?" he asked.

"It's an idea," said I. "Let's try it."

We hunted round until we found a general store and here, sure enough, we were able to buy a packet. On the packet, the name of the local agent was given, and an address, so we looked the fellow up.

Señor Fernando Lopez was a stout and very tired Spaniard, it seemed at first sight, a typical dago who had difficulty with English. He was too polite to yawn in our faces, but he looked as if he would have liked to. And he did not change a hair when I casually flashed the star that was pinned to the inside of my coat. All he did was to waddle over to a door and push it open, with a lazy wave of his yellow hand bidding us step inside. But once the door was closed on the three of us in that inner room, Señor Fernando Lopez spoke idiomatic American.

"Say, boys," he said with a quick smile, "mighty glad to see you! What's the trouble?"

I explained who we were and our present needs.

"Aviation spirit?" said Señor Fernando. "Sure! So you're Mr. Boon and Mr. Lamont? I've been hearing about you. Glad to see you, boys—glad to see you! I have been wanting to see you for a week or two past. I was hoping you'd drop in here one day."

"That's funny to hear, Mr. Lopez," I said in some surprise. "It's the merest chance that brought us to Maracaybo. What made you think we might turn up?"

"Sit down, boys, and I'll tell you," said he. "No—stop a bit. We'd better be comfortable——"

He opened another door. This led into a courtyard, a widish space with palms and flowers, and surrounded by a sort of cloister of old arches. It was clean and sweet and cool, and a surprising thing to come on after the hot and dusty narrow street from which one entered the building. We found comfortable American reclining chairs in the shade, and when we were snugged down Señor Fernando clapped his hands Spanish fashion. A soft-footed yellow servant appeared, and our new friend jabbered an order at him. Next moment the servant was back with a tray of glasses, a bottle or two, and a bowl of ice.

"I won't ask you what you'll drink," said Fernando, "because I know what's best in Maracaybo. I prescribe!"

He manipulated the bottles, and whisked in the ice. The result was a beautifully colored, bubbling drink in each of three long glasses.

"Bury your noses in that!" said Señor Fernando. "Say, boys—I'm mighty glad to see you!"

He nodded and took a long pull at his glass, an example that Dan and I were apt enough to follow. I will say that Señor Fernando Lopez could mix a drink!

"And now, boys—I'll tell you one of the reasons why I'm so mighty glad to see you," he said. "That's apart from the fun of seeing your American faces." He leaned forward in this chair. *"I think you're on a hot scent down here!"*

Danny and I, you may be sure, pricked up our ears.

"You mean—the raiders?" I asked. He nodded

mysteriously. He had a funny little trick of a backward nod that seemed to call you closer.

"Listen! There are rumors along this coast—from here right along to Port of Spain—aye, and further—of an airship crossing the coast-line. At first, when the news came out about these raids, I thought it was only nigger and dago talk. But the thing has persisted. I've been to the trouble of having the thing—the rumor—followed up, and I'm beginning to think there's something in it. So far, I've only reported it to headquarters as perhaps dago and nigger fiction, but —now—well, I think it would pay you to haunt this coast for a spell. Do you get me, boys? I have nothing definite to give you except my own opinion—and that is, *there is something in it!*"

We caught fire, Danny and I.

A Sudden Appearance

WE dined and slept in the house of Señor Fernando that night, and from somewhere our host procured a supply of first-class aviation spirit. His own men took it down to the seaplane, and Milliken looked after the replenishing of the tank.

In the morning, with a cordial invitation to make the house of our useful friend our own whenever we were in Maracaybo, we set off down the coast. For a week we haunted the sea-line, back and forward from Maracaybo to Cayenne, without getting wind of our quarry. This brought us to the middle Monday in June, when for another week we were storm-bound in Maracaybo.

The hospitality of Señor Fernando was limitless, but our enforced inactivity was very galling. Our only consolation was that if we could not take the air, neither could the raiders. But by the Saturday of the third week in June the tropical storm was over, and again we set off down the coast of the Main. We trailed along the Leewards, and on the Sunday morning early got out from Port of Spain to search the Lesser Antilles, for we were still keen on Milliken's idea.

Then at eleven o'clock that Sunday we picked up a radio telling of an airship raid on shipping on the other side of Panama. We made right back to Maracaybo, where we found Señor Fernando, to whom we had radioed, waiting for us in the harbor with a full supply of gasoline. We filled up, and were off again.

We came down at Panama to seek information, and we were told that the raids had taken place on the New Zealand route off the Galapagos. These islands were our next objective, and we made them just on nightfall. We were mighty tired, though by this time Dan was up to handling the machine and had been spelling Milliken and me, but as we could find no safe mooring, we took off again and reached Guayaquil in the dark. Here we found a mooring in the roadway of the bay, and we hitched to it without asking permission. We set no watch, but lay down to sleep, determined to be stirring with the first streak of daylight. But when daylight came we landed on a piece of bad luck.

It was just after four in the morning, and Milliken and I were going over the engine. A sudden imprecation from my mechanic made me go over to the side he was examining, and I saw him gazing with a rueful face at the gasoline supply pipe to one of the starboard carburetors. It was snapped clean through close to the carburetor.

"Well," I said, "there's no use making a post-mortem on the thing, Milliken. We'd better straighten one of the coils a bit and braze a new junction."

"Right, sir," said Milliken, and went to his locker for the necessary tools.

Although we had flown from Maracaybo to Panama, and from there to Galapagos, thence to Guayaquil, I was not prepared to see the gasoline gauges so low. I concluded that there must have been a good deal of leakage from the fracture, before it absolutely parted, and I took one of the dago boatmen that were now round the plane, and went ashore for a supply of the juice.

My boatman was a traveled man and a linguist, and I was able to make him understand what I wanted. He conducted me up the quay, and led the way to a gasoline store sure enough, but it was somewhere round half-past four in the morning, and there was nobody about. The place was shut.

I was standing grumbling at the luck, when suddenly my dago let out a yell, and began pointing right above him into the sky.

"See, senor!" he cried. "Look, look! The air-sheep!"

A thrill ran up my spine, for there—high above the town—like a tiny spear blade of silver in the growing light of the morning, floated the *Ark of the Covenant!* I was sure of her. There were no two ships of the same design in the world—unless they belonged to the raiders.

It was galling, I need hardly say. There lay the *Merlin* in the roadway with a parted gasoline pipe, crippled to a certain extent, and with her tanks more than half empty! And high above her the quarry sped, serene and beautiful, heading straight across the Andes!

Mad as I was, I had the sense to take an accurate bearing of the airship's course, then I flung myself into a useless activity. I yelled at my dago, and at the others who were gathering round. I threw money at them, and made them hustle to find the man who ran the gasoline station. As good luck would have it, he turned out to be a Scotsman, but it was forty-five minutes before he made his appearance, for he lived outside the town. When he did come, he came running, and he was still putting on his clothes as he came.

In as few words as possible, I explained the situation to him.

"Bide a wee," he said, unflustered. "Let's think. I could give ye petrol frae tins in the store, but y'd have to manhandle it to your plane—and that'd take time. No, by jingo! I have a tanker lying at the quayside bung fu' o' the juice. Could ye manœuvre your boatie alongside? We'll soon have your tanks fu' if ye can."

In Pursuit

GIVE me a Scotchman any day for sense! I hustled McQuharrie into the boat and we pulled out to the *Merlin.* Milliken had the breakage fixed, and we taxied the bus alongside the tanker. In no time, McQuharrie had a pipe and a pump fixed between the tanker and the plane, and in a little the *Merlin's* tanks were brimming.

"How much is that, Mr. McQuharrie?" I asked.

"Damned if I know—I didna measure," he replied. "Don't bother wi't. Off you go, man! I'll send ye a bill——"

"But you don't know anything about me——"

"Don't I? Trust me for that. Off wi' ye!"

So he yelled at us from the side of his tanker, dancing with excitement the while. We sheered off while he waved at us, and we taxied down the roadway preparatory to taking off for our climb over the town.

Milliken and Dan had both seen the airship, and they confirmed my idea of her direction. Soon we had left Guayaquil behind and were climbing, climbing for our flight over the Andes. The verdure of the coastal strip passed beneath us, and we rose over a still and rugged barrenness. Up, up we flew, nor did we flatten to level flight until over eight thousand metres was showing.

Banks of clouds lay far below us. To either side and in front of us stretched the mountains, their peaks glowing jewel-like in the sun—crimson, saffron, gold—their hollows and deep cañons, cobalt, purple, indigo. Range on range they stretched, scaur and hump and tooth, cleft and riven, moulded and hewn. And everywhere an awful stillness, a stillness that made the steady song of the seaplane seem sacrilege. Below us no bird floated, about us no wind stirred. except for the wind of our own speed through the bitter air.

All apertures of the cabin were closed, we had the heaters on, and we were breathing oxygen, while compressed air was being fed to the induction of the cylinders. The speed dial stood at well over the five hundred kilometres mark, and though our quarry was over an hour ahead of us, we had great hope of overtaking her.

Time passed. Danny shared the lookout with me, while Milliken rustled a meal to break our fast. When it was ready he took his share before relieving Dan, and when Dan had eaten I gave the control to Milliken and ate last of all. I wanted two pairs of eyes for the lookout all the time. Yet for all our vigil we came upon no sight of the airship. We reckoned her speed at two-thirds of our own, so that if we were in her course we should have sighted her in about two hours' flying. Two hours passed, and it seemed that she had escaped us.

We kept heading in the same direction for about another half-hour, then we consulted what to do. It was decided that we cast a wide circle to the north, keeping high, so I swung the *Merlin* in a wide loop up into what must have been the southern border of Venezuela. I reckoned to describe a circle five hundred kilometres in circumference, which at the height we were flying would give us a vast area for scrutiny. We were now over the upper reaches of the northern confluents of the Amazon, and beneath us rolled endless miles of dark green-grey foliage. We saw here and there the silver gleam of water, wide rivers that thinned, were lost in the foliage, and appeared again. But everywhere the dominant note was that hardly broken hue of dark grey-green. If the airship had been anywhere below us, it would have been distinct against that sombre background. But time and again the distant gleam of water would deceive us, would send us chasing at full speed, and our circle grew very ragged of outline.

The strain of flying at that height and speed was beginning to tell on us, and our constant watch had wearied our eyes—in spite of that uncanny alertness of perception which quick flight induced—so at half-past ten, when we had cast two wide circles, we voted a spell of rest, and I searched about for big enough water in which to come down. We seemed to have missed our quarry entirely.

Then, in the midst of that drab green monotony below us, with its endless hummocks of undulating tree tops, there came a break. From what appeared to be an area of marshland, for it was speckled with water, there rose a short incline of bush; this was succeeded by a spear of plateau rising on tawny bluffs of rock. Mighty interesting we found this plateau, for from a point north of its centre line, in a widening scar, there stretched to one side of it a sudden patch of blood red. By chance, I have hit on the right word to explain this red streak. It was more like a raw scar on the face of the world than anything else. From its starting point it widened as it ran transversely over the green tableland, then began to narrow as it dropped over the bluff on the south side, until it was lost in the green of the lower levels.

"Seems to be some curious outcrop," said Dan. "Doesn't it look sinister and cruel, somehow?"

"You've hit it, Danny," I agreed. "That's just what it does look."

Near this red streak, but separated from it by a thickening band of green, the plateau took another sudden rise in bush-hung rocky bluffs, and on this second step, as it were, there lay a wide expanse of water, under the spurs of what from the map I judged were the foothills of the Parima Mountains.

"Let's land on the lake there," said Danny, "and maybe we can get down to look at that outcrop. I'd like to see that."

The water seemed fair for landing and, what was more important, for taking off again, so I let the *Merlin* hover down gently to the face of the lake. I taxied a little on touching, then switched off, and let the way on the plane carry her until she was nosing into the trees and bushes that fringed the still water.

The Plateau of the Red Scar

THERE was something uncanny about that lake, though it was wonderfully beautiful. The trees round it were not extremely tall, but they were straight and smooth of trunk, their branches beginning to shoot out only at a good height. These locked with the branches of the others around, until the foliage above was a thick canopy unpierced by the rays of the sun. The undergrowth was thick and luxuriant, but not nearly so high as I had thought it would be. The prevailing color was a dusty green, unbroken, unrelieved, except for the browner grey of the tree-trunks, or when some big butterflies, gaudily painted and amazingly wide of wing-spread, would flutter swiftly by.

Now and then there would come the shriek of a bird, shattering the stillness and intensifying it. I have said stillness, but it was not so much that. A weird hushed murmur clung to the place, the hum of insects, the sound of a myriad life—and under it all a mysterious deep chatter and whisper, whisper and chatter, so dead in tone as to be almost undefinable as sound. The place gripped. It almost sickened one with its intensity. And one could not tell what it was that gripped, what brought the sickening intensity. Here man was terribly puny in the face of immutable nature, and my lovely *Merlin* in her modernity was an offence.

I think my companions felt much as I did, but it wasn't a thing to talk about. We looked at each other with a sickly kind of gaiety, like a lot of boys stolen into a cathedral in prohibited hours.

Milliken, the practical, made the first attempt to break the spell. He lit the stove and brought out the frying-pan. We had a sort of second breakfast, and then Dan and I clambered ashore, leaving Milliken, who would not be persuaded to leave the *Merlin*, to keep watch and ward.

For our adventure, Danny and I took with us an automatic apiece, and a pocket compass. Both of us

had flying-boots on, so we felt safe enough about snakes, which were all we thought we had to dread. It seemed impossible that there could be any human beings in that wilderness.

We pushed our way westward through the undergrowth, making for the bluff that overhung the plateau of the red scar, and although the going was heavy, it was not superlatively difficult. With half an hour of scrambling we were on the bluff, and the oppression of the dark forest left us as we breathed the sweet air of its edge. Down below us lay the tableland, perhaps forty metres beneath, and we could see the red outcrop plainly. Water lay on either side of the plateau; to the south a winding river with a creek running up to the cliff of the highland, and to the north a small lake we had barely noticed in our approach by the air from the south. This lake was drained, it seemed, by another winding river that ran through a little gorge into the marsh-land surrounding the toe of the plateau. We found a place where the limestone was not so sheer, and a way down that promised a fairly easy return.

Trees hugged the base of the bluff, but we soon were quit of them as we worked towards the red scar, for they thinned out until we were among bushes of the nature of myrtle. As we got nearer the outcrop even these myrtles thinned, until they were far apart and strangely stunted in growth. Then our feet crunched on the red earth.

To me that earth seemed to be living! I felt the hair prickle on my scalp, and I had a foolish impulse to jump back to the blacker—and somehow *cleaner*—soil!

"Nothing grows on this red stuff!" whispered Dan. "See, Jimmy, there's not a plant or a blade of grass on it, and look how these myrtles are thinned and stunted until they are away back from it!"

"Let's get off it, Danny," I said. "I don't like it."

"You feel that too?" he muttered "I suppose it's the desolation of it, but I have just the same feeling."

"Let's work round it, then," I said.

Danny did not seem to hear me. He was frowning at the earth and scrabbling amongst it speculatively with the toe of his boot. He turned over a piece of rock and stooped to pick it up. When he straightened himself his face was red, but the color came from some suppressed excitement.

"Look at this, Jimmy," he said, holding out the rock. "Do you know what it is?"

It was a cindery kind of rock, blue-black in color, with facets that shone faintly, and a dusty layer, saffron to deep rose in tint, clung to a side of it. I had never seen rock like it before.

"No," I said.

"I'll eat my hat if this—the red stuff—isn't rhodolite," said Dan, his eyes dancing.

"Well?" I said pettishly, for I wanted to be off that red muck.

"Rhodolite, Jimmy," Dan said solemnly, and there wasn't so much of the boy about him now. "Rhodolite is one of the most highly radio-active ores that have been discovered. Small quantities of it have been found in Africa and, I believe, in Peru. I have had pieces of it in my lab.—but nothing nearly so good as this!"

He crouched down now, letting the red stuff dribble through his fingers.

"I have a hunch," he said, "that all this scar is highly radio-active. That explains why nothing grows on it. See how the trees avoid it, how the bushes close to it are poor and almost withered. Yes. Let's get off it, Jimmy. The thing's alive!"

They Meet Again

WE made our way back to the decent earth, and worked northwards round the end of the red scar. We were a strangely silent couple then. Dan had lost his boyishness, and his face had a queer expression of power. I was getting a flash of the Daniel Lamont who could add so many letters to his name, the Daniel Lamont whose word went with the leading scientists of the day.

We trudged through the undergrowth in a nor'-westerly direction, making for the edge of the plateau that overhung the little lake we had seen from the bluff above. With my heavier bulk, I broke the trail, my friend coming after me. I don't suppose we had been laboring twenty minutes before we were on the edge of the plateau.

Below us lay the little basin from which ran the winding stream, but because of the configuration of the cliffs and their overhang, our view was not very good. Half the basin was cut off from sight by a ridge that ran out from the side of the plateau.

"There's a mighty funny air about that place down there," Danny whispered, when we had looked in silence for a minute or two. "What is it, Jimmy?"

"I don't know, Dan—unless it is that it's a little too trim for its surroundings.

"I think you've said it, Jimmy. Wouldn't you say that the neck of the basin has been widened? Or else why are the river banks there so sheer, when at other places they're undercut or fallen in?"

"Spades?" I whispered.

"I'd say so."

"Niggers?"

"Not the kind of thing niggers would do."

We discovered a growing suspicion in each other's eyes.

"What do you say to crossing the plateau to the other side," I asked softly, "and seeing what's there? Does it strike you, Danny, that the little lake below must be filled from somewhere—or else how do you explain the steady current into the river?"

"That strip we took to be a creek on the other side—maybe it flows under the plateau——" said Danny. "Let's investigate, anyhow."

We turned south, and began to work down the west side of the scar. For a space the going was heavy, but after a little the undergrowth began to thin out. The plateau seemed to be about a kilometre wide, perhaps more, so with the heavy going at the start of our crossing the journey looked like taking us about half an hour. I wanted to clear the thing up, get back to the *Merlin*, and be in Maracaybo by nightfall. It was now long past noon, somewhere about half-past one, and the heat was oppressive. We had to make our way back over the red outcrop, climb the bluff, and find our trail through the forest to the lake above and the *Merlin*. My suspicion had died down. The whole place was so desolate and lonely, so silent, that to think we were somewhere in the neighborhood of the raiders' lair seemed too far-fetched. I was anxious to be on the chase again.

Danny, however, had some idea in his head. He was plugging along by my side with an alertness and keenness that I was at a loss to account for, so after a long spell of silence my curiosity got the better of me. I turned to my friend and stopped him.

"Come, old man," I said. "Out with it! What's in your mind?"

"Honest, Jimmy," he said, "I don't know. I'm just a lump of suspicion—that rhodolite, you see. I've got it sort of mixed up with radium——"

"You mean——?"

"Yes. Confound it, Jimmy! We've got to account for all that radium somehow——"

I gazed at him for a second or two.

"All right, Dan," I said. "Let's go on—but if there's anything in it, we're too far away from the *Merlin* to be comfortable."

We went on. I now caught more than a touch of Danny's excitement and alertness. We were pressing south, a little westwards, when suddenly we caught a gleam of something high and white among the grey-green of the foliage, and towards this gleam we cautiously threaded our way. Presently we were near enough to see that the whitish gleam came from a number of conical stone spikes standing high among the bushes.

"Sinter cones," whispered Dan, "like those of Hammam Meskoutine in Tunis."

"Dried-up hot spring?"

"Yes. A gradual crystalline precipitation building up into a hollow cone."

"Mighty queer plateau, Dan——"

"It *is* a mighty queer plateau, Jimmy," he interrupted. "Just take a look at the peak of that middle cone. What would you say that shimmering haze was?"

"Heat, by hookey! It's a kind of chimney."

"Gimme a leg up, Jimmy," whispered Dan, "and let's see what kind of heat!"

We trampled through the undergrowth to the side of the middle cone, and then I helped Dan to climb up to the top. He put his head close to the mouth and sniffed cautiously. Then he turned round and down to me with a face livid with excitement.

"Oil-burning, Jimmy!"

I let him slide to the ground.

"Don't you see what it means, Jimmy?" he cried. "There's something doing underground! It's the smell of petroleum! By Christopher, Jimmy, I believe we've tracked them!"

"Exactly," said a familiar voice behind us. "Put up your hands, Messrs. James Boon and Company! We rather expected you'd be dropping in one day."

We turned in a hurry, to find ourselves looking down the muzzles of three rifles projecting from the bushes. Then behind a pistol in front of us the bushes parted. A big man rose up to his full height, still covering us. It was Commander Seton!

END OF BOOK ONE

Book Two—The Personal Narrative of Sholto Seton, D.S.O., D.S.C., etc., Commander R. N.

CHAPTER I

The Litter in the Clearing

IF patience and determination have brought readers thus far in a particularly haphazard and ill-knit story, apology from me for taking them back three years will be superfluous. Pertinacity so singular—though it be grown but from an irritated desire to finish a penance—will find nothing daunting in even so drastic a backward leap. Yet, by way of apology for the retracing, I am fain to say this much. If I am to achieve reasonable accuracy in my share of the history, and if I am to make myself properly understood by the patient reader, I can do no other.

In the matter of introducing myself, the flattering analysis of my character, and the slight sketch of my history, given by Major Boon in his narrative, like the wound of Mercutio, though they are "neither as deep as a well nor as wide as a church door," they will "serve." Indeed, they must serve, *faute de mieux*, since I have wasted much breath and time in urging Boon to alter them or delete them altogether, and I cannot begin to give my own version.

In justice to myself and you, I am compelled to say, further, that the pen is a most unfamiliar implement to me; my wildest hope is that I may spin a plain yarn True, I have gained a measure of courage for my task through watching the airy insouciance with which Boon has been pounding out chapters on his typewriting machine, and I tell myself that if he can be without bowels of compassion for his readers, so surely, can I. As I go along I shall try to vamp something of a technique from him, and from other great writers, and so win through with what credit I may.

Three years, then, before that morning in March when the *Ark of the Covenant* dropped silently from the skies upon the financial center of New York, I was, with two ex-petty officers of His Majesty's royal navy and a handful of Indian bearers, among the upper reaches of the Rio Negro, that northern tributary of the Amazon. Of the reasons and the urges which took me into such an isolated and labyrinthine tract of wilderness I shall say little. They are personal, and might easily be tedious. I was seeking what I might find in unexplored country.

Higgins, Grumstock and myself came upon many things of a strange nature in that wilderness, but by far the strangest thing that happened to us was the finding of him whom we afterwards were to know as "The Master."

It was towards nightfall of a teeming-hot day. We were about to make camp by the side of an unnamed river, tributary to the Negro, and were looking for some place suitable, when suddenly we broke into a small clearing in which were the remains of a recent camp. So recent, indeed, were these remains, that there, where a night's growth will obliterate anything but the deepest of man's handprints, the undergrowths were still trampled and awry. About the clearing empty boxes with smashed lids were scattered, and these brought to the scene such evidence of haste and confusion that interest was at once deeply stirred. I knew of no party ahead of my own, nor was there wind of any coming down from the borders of Venezuela or Colombia. It was unlikely in the latter case that the explorers had passed us, since it was impossible that they had crossed unnecessarily to the other side of the river, or had strayed far from its bank

From the indications around we were forced to the sinister conclusion that the former occupants of the clearing had been attacked by Indians. No sane explorers would have indulged in the frenzy of breakage or the partition of stores which was shown. I resolved, therefore, with the help of my two men, to arrive at what solution I could of the mystery.

As a preliminary to the search, we made camp then and there. The bearers were ordered to unload and pile stores. Higgins and Grumstock, avid for anything which promised a break in the monotony of weeks of toilsome journeying, quickly had the tents erected, and,

with that unfailing *lingua franca* by which the British seaman makes himself everywhere understood, badgered and cajoled the Indians into unheard-of activity.

Our search was not of long duration. A sudden shout took me hurrying back from the side on which I had started investigations to the other, and here, a little way deeper in the forest, I found my two men in awed contemplation of a roughly-made litter, which was slung at a fair height between two trees. In this litter a white man lay, to all appearance dead. He was a small man, and my two helpers had no difficulty in unhitching the litter from the trees or in conveying it to the nearest tent, my own, as it happened. Under the powerful light of a petrol lamp I made examination of the stranger, and I found his heart, though scarcely discernible, was still beating.

Even with that rough-and-ready medical knowledge which I have, it was plainly manifest to me that collapse had followed fever and partial starvation, and I began to administer gentle stimulants and easy nutritives. My labor was rewarded by a slight strengthening of the heart-beat, but there were no signs of returning consciousness.

I stripped the man to put him into clean linen, and I was horrified to find that his body was terribly burned. A great patch on the left side was deeply raw and inflamed, and—most nauseating feature of all—the left hand seemed to have been burned off from above the wrist. It was a marvel that the man remained alive. These were injuries which I despaired of treating adequately from my little medicine chest, and I should have been completely at a loss what to do had the stranger not had the means of treatment with him. In the litter whereon he had been lying we found, beside a wash-leather bag apparently containing geological specimens, a large pot of reddish ointment, clean and fresh. I could find faint traces of this ointment on the fair skin round the burns, and I thought the wisest thing in the circumstances was to continue the use of it. I took clean strips of medicated linen, and with loose bandages of these I applied the ointment to the dreadful wounds.

It was two days before the man opened his eyes. We had not attempted to break camp, and our stay in the clearing had been without event. The return to consciousness was abrupt. I went into the tent to see how the patient was progressing, and found myself gazing into the mildest pair of blue eyes I have ever seen. Mild though they were, yet something lay in their depths that one met with a shock almost physical.

"What is your name?" the stranger asked levelly.

"Sholto Seton," I replied.

"An explorer?"

"In an amateur way—yes."

"How long ago is it since you found me?" he demanded.

"It will be forty-eight hours ago at seven this evening. You were in a litter slung between two trees."

"Yes. I made my bearers put me there. What day of the week was that—Monday?"

"Monday," I said.

"Yes. This is the third day of the sun since I became unconscious. It was on Monday that my bearers deserted me. You were in the nick of time, Mr. Seton—am I right in the form of address? You have the look of authority that comes from command."

"I am by courtesy Commander Seton—lately of the British navy," I replied. "But do you think you should talk, sir?"

"I shall finish in a moment," said this strangely self-contained patient. "With what have you been treating me?"

I explained what I had done.

"Excellent. Now, Commander Seton, I am afraid I must draw on your patience and good nature to the extent of relapsing into unconsciousness for another day. Continue the treatment—especially the ointment, which you must not attempt to vary in any way. It is adequate in itself. Thank you. And until this time to-morrow, when I shall waken in complete command of myself—good-day!"

He closed those remarkable eyes of his, and was asleep. I was left with the impression, despite his utmost frailty of physique, of a personality nigh ruthless in dominating will-power, a personality which gripped with hoops of steel, and of a courage, in the face of what must have been agonizing pain, which nearly appalled.

For the space of ten minutes, I think, I stood where I was. Then I tiptoed over to look down at him. He had not fallen asleep. He had relapsed back into a state of deep unconsciousness.

I marked the broad brow and deep head of the thinker, the exquisite placing of shapely ears, the fine setting of the eyes, the clean chiselling of the nose. Through a thin brown beard and moustache could be seen a mouth in shape at once firm and mobile. It was a head in a million, satisfying one's senses with both beauty and power. In spite of the luxuriance of his fine brown hair, I judged him to be from fifty to sixty years of age.

I stole from the tent.

Seton Enlists

HE recovered as I have seen a boxer recover between rounds, deliberately. He rested, deliberately relaxing until he was ready to stir, and it was a fortnight before he moved from the tent. I had not asked his name, nor did I ever ask his name. From the first I called him "sir," until it came to the time when I openly called him "Master." Strange though it may seem, from the first I knew that he had but to lift a finger and I would obey his behest. Nor do I think I ever departed from my manhood right in giving him such service.

It was a fortnight before he began to speak at any length, and in this silence it seemed that he rested his brain as deliberately as he did his tortured body. My two seamen, Higgins and Grumstock, accepted him as I did, and they almost fell over each other—or even out with each other—in their desire to do him service.

I shall not readily forget our first long talk, deep in the heart of the murmuring forest. It was night, and we were in the tent together, for we shared it now he was fit to walk abroad. I was putting some notes together of my observations in exploring, when suddenly he spoke.

"Seton," he said, "I am ready to talk if you are."

"Yes, sir," I said, as readily as though a talk had been prearranged. "I am ready."

It was a matter of turning my camp-chair to face him, and then he bade me tell him of my experience in the war of 1914-18. I had none of the hesitation I should normally have felt at obeying such a request. I told him all I had done from start to finish.

"Would you have it happen again?" he asked, when I had finished.

"No, sir," I said truthfully. "I hope we have seen the last of war forever."

"A vain hope, my good Seton," he said quietly. "The nations of the earth have forgotten. They have forgotten the bloodshed and ruin of those terrible years, the martyrdom of women, the sacrifice of men. Too quickly have they forgotten. Lust and anger sway them, and the greed of gain, jealousy of their neighbors. In their blindness they would repeat those awful years."

"I know," I said. "They are fools. I give them another three years—and some of them will be at it again. It will be bigger than ever. I knew my hope was vain when I expressed it, sir."

"Three years!" he said, half to himself. "It could be accomplished in three years." Then aloud: "Are you a rich man, Seton?"

"I have rather more than half a million English pounds."

"How much of that fortune would you give," he asked, "if it were guaranteed to you, beyond any possible doubt, that war could be stopped forever on this earth?"

"Every penny of it, sir," I said.

"And if I, Seton, if I offered you that guarantee?"

"Why, sir—I'd listen to you—I'd help——"

He looked at me in silence for a minute. From far away in the forest around us there came a deep boom as of a great bell suddenly smitten. What it was I cannot pretend to say, but the forest is like that. A great noise, quite inexplicable, then the silence once more, save for the never-ceasing whisper that hardly breaks the uncanny stillness.

"Seton," said the man earnestly, "I want your word that if you cannot believe what I shall tell you, if you cannot see your way clear to stand by my side—I want your word that you will never repeat a syllable of it to ears other than mine, that you will lock it up in your heart forever."

"I give you my word, sir."

Then the Master laid bare his plan to stop war.

Even now, with the years behind me when I worked by his side, my brain reels as I remember that night. Far into the night the Master talked, patiently explaining to my lay understanding secrets that have revolutionized science. He told of the mighty power which had come into his hand after years of endless labor, of picking up discarded threads at first thought useless, of following up paths of promise which ended in disappointment, and in the end of the discovery of a further path which even he with all his magnificent intellect dared not pursue to its end.

It was unbelievable—yet I believed. In the hollow of that frail hand, its fellow lost in indescribable suffering and torture in the search for that terrible secret, there lay the power to free mankind, or to destroy, to lay waste the whole earth—aye, and worlds beyond. I believed, but belief was agony.

Hour after hour he talked, in that tireless, untiresome level voice of his. A litte man, frail, suffering the tortures of the damned from great cracking sores, yet placid, mild, gentle, with never a wince, never a smile even to mock his anguish. Years of Calvary lay behind him, and a quarter of a century of ceaseless toil. . . .

I say no living man could endure as the Master endured. As he spoke to me in the forest that night, I began to think that everything but the Will was gone; body, soul—everything which goes to make up the moving, whimpering, purposeless thing we call Man—everything but the Will. The Will and the Vision.

Yet, as I look back on the years that began that night, remembering the love I bore him, and the tender, winning, ungrudging, patient something that emanated from him to wrap me to him, I hope and pray that more than the Will was left.

"And so," he finished, "and so, my dear Seton, that afternoon when I opened my eyes and saw you, I believed that at last I had found my lieutenant. I believed that at last the path towards realizing my dream was opened for me. Are you the man, Sholto Seton? Think well, for here is the least I will take from you, the most I will offer you. Three years of belief, of unswerving devotion to my cause. Three years of unremitting toil, without reward except that which will come from the cause itself. I offer you no more. I will take no less."

As I rose from my chair, my whole body was quivering and I was soaked in perspiration. I could not answer him. I reeled to the tent door and out into the open, then stumbled across the clearing to the riverside. I put my head on two hands crossed against a big tree, and, do what I might, I could not hold myself from a terrible dry sobbing.

When I lifted my head, a faint light was beginning to steal through the leaves overhead, and birds were beginning to chatter. I walked back to the tent. He was still in his chair, as though he had not moved.

"Well, Seton?"

"Yes, sir," I said—"if you'll have me."

"That is well," he said. "And now, my dear fellow, find what remnants of sleep you can. We must begin at once, and I have much to tell you yet."

Off to the Plateau

IN the cool of the following morning we broke camp and set off on the long trek back to Manaos. Of the journey there is little of moment to tell. I had made my own arrangements for retiring from the wilderness, and they were fresher for being used a little earlier than I had anticipated. I had a bungalow outside the town of Manaos, and there I took the Master and my two men. I had paid off the bearers a good deal higher up the river, and we finished our journey on a power-boat of mine.

The wash-leather bag which I had thought contained geological specimens proved to have in it a collection of the finest rough Brazilian diamonds it has ever been my fortune to see. The Master, in the characteristically sparing way he had, simply stated that he had discovered a pipe of them in the higher reaches of the Negro, and his idea was that funds for beginning our work should come from the sale of these uncut gems. I had to go to Amsterdam to dispose of them, and it was also agreed that I should begin to liquidate my property by degrees, so that no suspicions would be aroused.

I left Grumstock with the Master at Manaos, and took Higgins with me to Europe, where, from a list provided me, I began to buy chemical and physical plants for the work the Master had to do. I had, in fact, to bring together all the instruments necessary for a small laboratory.

It was ten weeks before the liner dropped me and my stores at Manaos. I found the Master greatly recovered, and Grumstock very much installed as his body-servant, cook, and housekeeper. Grumstock informed me quite gratuitously that he was ready to follow the Owner—as he called our leader—anywhere.

On this hint, I found it expedient to outline the plan to my two old petty officers, and I was gratified to find them willing and eager to come into the scheme. Thus we had two good men, tried men, honest and handy, as a nucleus for our crew.

A few days after my return to Manaos we began our voyage up the river. At a former base, where I was friendly with a local headman, I was fortunate enough to secure a fine lot of bearers. Among the stores they carried were the sections of a good-sized canoe. Grumstock was an efficient carpenter, and the plan was to finish our journey by water, after he had put our little craft together. This plan, the Master assured us, was possible.

It was perhaps as well that the plan included the dismissal of our bearers when we took to the water, for as we approached the end of our portage, it became manifest that the Indians were growing restless and uneasy. I was afraid that they were about to desert us, and I searched for the reason of their unrest, but found the more intelligent of the bearers unwilling to talk. It was Higgins who brought me the clue.

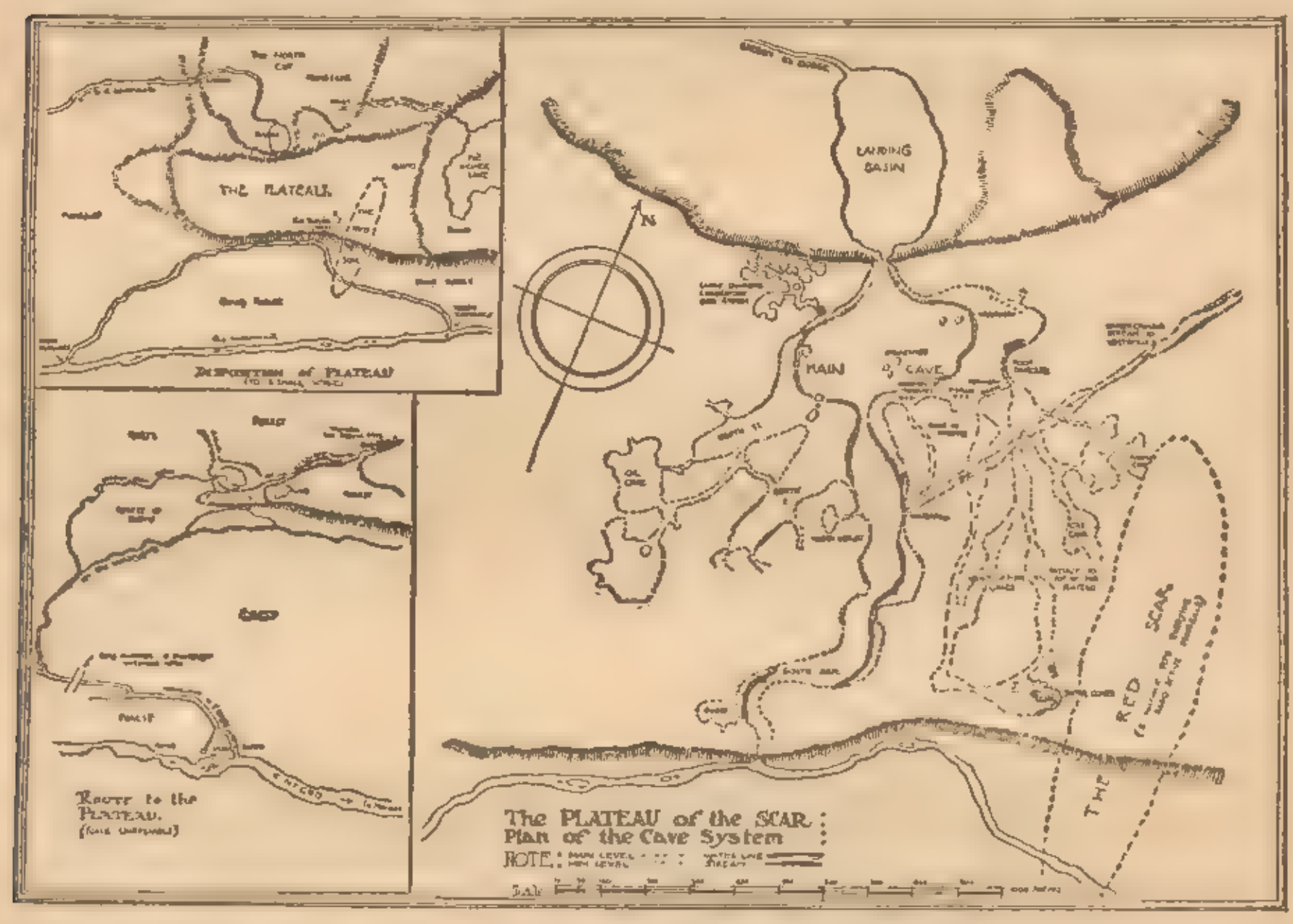
"As far as I can make out, sir," he explained, "we're headin' due and proper for a place they call the Hill of Spooks. Another name they give it is the Wound in the World. Accordin' to them niggers, there's a great big bloody scar in the body of the earth somewhere near 'ere, and every now and then you can hear the earth howlin' and groanin' wi' the pain from it. It was old Brass-bottle that told me about it, and a scared nigger he was too when he said it. I got it from him by degrees, like."

I took this report to our leader.

"Yes, yes, Seton," he replied. "It is a point in our favor. The scar is there on the plateau, a red outcrop of radio-active minerals, which I hope to be able to use to some purpose. Nothing will grow on the outcrop, and at certain times of the year, water or wind through some underground passage of the plateau gives out a terrible howling. Hence the fear of the natives. But, as I say, a point in our favor, since we may work unmolested."

When we reached the water, the relief of the bearers at being dismissed was evident. We had no sooner freed them than they trooped off back the way we had come, and they were, I think not a little scared for us.

The work of putting together our canoe occupied Grumstock and Higgins and myself less than a day, and when we had her in the water, we found her admirably suited for our purpose. She held our stores easily, and there was sufficient room left to afford our leader his ease—or as much ease as his poor body would allow him—together with space for the adequate handling of her.



Into the Cavern

IN the early morning we set out for the mysterious plateau. I shall say nothing of the journey except that it was arduous.

Major Boon has given a fairly accurate description of the lay of the land about the plateau. Its main axis ran from east to west, and the toe lay among marshy ground, thickly grown with bladed plants and the myrtle and veronica type of shrub common in the district. On

the north, a little basin lay under the plateau cliffs, and our approach was by a river which flowed from this basin, through a gorge quite navigable, and bore in a westerly curve from a cup of land of which the plateau was the southern border.

On the south side of the plateau another river lay, or rather a backwater of that river which I shall call the Rio Innominata. We did not realize at our first approach of the plateau that it would have been possible to cut off several leagues of travel by making a portage to that backwater, of which both entrances were cut off from the main stream by a mass of fallen timber very much overgrown. We took, instead, the longer way. Out of the Rio Innominata at a good number of kilometres downstream from the backwater, we turned into the basin river, and described a wide loop to the north of the plateau. From the map it will be seen that both the Innominata and the stream from the basin in the northward cup flow west for the greater part of their courses, and that the former turns south at last to curve into an easterly-running tributary of the Negro. In subsequent voyages the longer route I have indicated was always followed, and as a precaution against being detected we left the overgrown entrances to the backwater undisturbed.

The basin to the north of the plateau was overhung by great limestone bluffs, which from the top must have hid half the basin's area, and this impending wall of rock was pierced by a great arch that led to a cave under the plateau, cave and basin being joined by water.

It was with a sense of awe, having lit the acetylene searchlight in the bows, that we began to paddle into the cave. The light but faintly illumined the vastness of the underground cathedral in which we now found ourselves. The ceiling was roughly arched, and in its shadowed height one imagined that a fantastic pattern of vaulting could be traced. Here and there, stalactitic pillars of great girth gave color to the gothic effect. We became conscious of the roar and plash of falling water, then deep in the heart of the cavern we came on a waterfall in which from a height of about forty metres a swift stream tumbled in great volume.

"By Jove! sir," I whispered to our leader, "what a chance there for power!"

"Yes," he replied. "But you will find the fall the least of the wonders I have to show you. Bear over to the right, Higgins, please."

I now saw that from the main cavern other caves ran out on either side, several of them with floors sloping clear of the water line. Two of these in particular, on the west, with a common mouth to the main cavern, were ideal for docking and building the airships which were part of our scheme. With our leader I went ashore to examine these two caves, and he led the way into an inner cave, rather smaller than the other pair.

"Here, Seton," he said, "we are standing, I am certain, on the down slope of an anticlinal fold. See how it runs down under the basin of the main cavern. At the toe of the plateau, which I take to be the further slope of the saddle, I found among the marshes certain indications of the presence of petroleum—that greenish scum which I dare say you know—"

I nodded.

"Very well then. If it can be avoided, we do not wish to drill for our oil in the open, but I think if we drill here we may do so with a reasonable hope of striking."

We passed round a wall of rock into another inner cave.

"If we block up this cave, having first made certain that there is no other outlet," said the Master, "don't you think, my good Seton, we shall have an adequate reservoir for our crude oil?"

"Why, yes, sir," I replied, in bewilderment at the completeness of the thing. "A few bags of cement would put it right."

"Exactly. Now, on the other side of the main cavern there are other caves I should like you to see. I am inclined to think that we shall have our refinery and machine shops over there. And I believe we shall find ample ventilation."

From the main mouth of the caves, a ledge ran on the east side to widen out into a spacious floor on the left of the big central cave. This was so wide and deep that it was easy to picture an extensive machine shop there, with plenty of room left for the oil refinery. Our power was handy to it, for the waterfall was only a few paces round the corner of rock.

We paddled deeper into the cavern, and found that it extended the whole width of the plateau in a winding course of waterway. At the other side, the south, egress was given by an opening with little headroom to a small creek joining the backwater of the Rio Innominata. There was some flow of water from the fall to this outlet, but the main run was to the northern opening. The land about the plateau was very flat.

We returned and our leader showed the way into a cave near the main entrance on the west side. We had to climb into this cave, which was so close to the plateau side that light percolated through from the open by several cracks. The cave was one of a series on the same level, high and dry, and apparently well ventilated. These, it was easy to decide, would be the living quarters of the crew when it was formed.

While Higgins and Grumstock brought out stores into the living cave by means of a hastily rigged block and tackle, I found a pick-axe and began to widen one of the crevices to the open air. It was easy labor, for the rock here was pliable, and I soon had hewn a biggish window permitting a view of the cup-like hollow to the north of the plateau. The stores were brought up. Grumstock and Higgins fell to setting out shipshape sleeping quarters, and presently to cooking a meal. We passed the night in better conditions than either the Master or myself had ever experienced among the upper waters of the Amazon. We were thousands of miles from the nearest civilization, right in the heart of virgin forest, and as cut off from the knowledge of man as if we had been in another world.

The Gas Found

IN the morning, after an invigorating plunge and swim in the clear cool waters of the cave, we set about forming a laboratory for our chief. We had no wood with which to set up benches, so we cut a deep ledge into one of the walls of the cave, and shovelled the debris out of the window opening. When we had made a good enough ledge to set out all the instruments and the plant our leader required, and had undercut it so that he could have comfort in standing close, we levelled the floor.

Meantime, the Chief had been exploring alone. Grumstock, with his ready wit, had fixed thole pins in the after part of the canoe's thwarts and had provided a long paddle-oar, so that the Master could maneuver the little craft with his single hand. He had been

away several hours, and I was beginning to think it time I went in search of him, when he returned.

"Could you spare half an hour from your labors, Seton, to come with me?" he asked.

"Certainly, sir."

"I shall require a wide-necked bottle. Could you find me such a thing, Grumstock?"

"I dunno about a bottle, sir," the seaman said doubtfully. "What about a pickle-jar, sir?"

"Excellent—if it has a stopper?"

"Stopper, sir—yes, sir. It's got one of them that works with a lever—expanding thing, sir," said Grumstock, with an air of being meticulously accurate to the man of science.

The seaman washed the jar carefully, and with this and a bundle of candles we set out.

"I have found a light gas, Seton," the Master explained, "in one of the high caves beyond the fall. I was climbing up into it with the naked light of a candle, when suddenly I found difficulty in breathing and the candle went out. I quickly retreated, and now we are about to take a sample. I need your two hands and strong lungs."

We were paddling across the main cavern, and he stooped over the side to the water and filled the jar, which he carefully stoppered. We landed on the eastern side and began to climb into a sort of tunnel, he leading. We had mounted some distance when suddenly his candle went out and he came back hurriedly. We now were outside a smallish cave above the level, so I imagined, of the main cavern roof.

"Now, Seton," the Chief said, "this is what I want you to do. Take the pickle-jar. How long could you hold your breath?"

"About half a minute, probably more."

"That will do. I want you to run up into the gas holding your breath. Raise the jar above your head and let the water pour out. Keep the jar mouth down, and as soon as it is empty of water, stopper it. Then come back as quickly as possible."

"I understand, sir."

"The idea is to get as far into the gas as is safe. Two steps higher when your candle goes out will do. Just see how long you can do without a breath."

I tested myself with the stop-hand of my watch, and found I could do forty-five seconds easily.

"Excellent. Now, don't run any risks. I'm not powerful enough to drag you out, you understand?"

"Right, sir. I'll take care."

I took the candle and the jar, and began to climb, holding the light over my head. As soon as the light went out I dropped the candle and took a breath easily, then ran up about four paces. I let the water out of the jar as I held it up, and quickly replaced the stopper. I retreated with some wind to spare.

"Well done, Seton," cried the Master. "And now to see the nature of the gas. It is light and I should say inert."

We returned to the cave in the cliff, and spent the rest of the day in arranging the scientific instruments, helping our Chief to prepare for his first test of the gas. He explained that it could not be a thorough test, but that he might be able to determine the nature of the stuff

That night I retired to the cavern where the two seamen slept, and turned in alongside them, leaving our leader working by lamplight.

In the early morning I wakened to find him standing by my bedside.

"Seton," he said, "I believe we have discovered a new light uninflammable gas, and I think we may have enough to lift our airship. We have saved months of labor by the find. You must set out for Europe again as soon as possible."

CHAPTER II

Forming a Crew

HIGGINS came with me in the canoe for the first stage of my journey to Europe, and when he had put me on land for my solitary trek down the Negro he left me, to return to the plateau. I had little difficulty, if it took me some time, in reaching Manaos, where I found a passage to New Orleans.

My purpose in making for this American port was simple, for there I had a friend on whose discretion and help I could implicitly rely. This was a Southerner, an American gentleman of the finest type, and one of those who in the early part of the European War had found a way into the British flying service. We had worked together in the service, and I knew my man for a close-mouthed, shrewd and capable fellow who none the less permitted deep languor and slow, drawling speech to belie a mind well above the average for alertness and keen business instinct.

Lippencott, for that was his name, was a trader in New Orleans, and I had decided on him, subject to his consent, as the most important link we should have with the outside world. I went straight to him and explained the scheme without reserve. He agreed to help.

I placed a large sum of money to his credit, and gave him lists of the plant and stores he was to purchase for us, lists which the chief and myself had gone over thoroughly until we knew we had missed nothing. Lippencott anticipated no difficulty in meeting our requirements and agreed to scatter the orders so that any trace would be difficult to find in the future.

At the plateau we had, for example, to drill for oil, which entailed the purchase of drills and casing, with the necessary power, and a small refining plant. Then we had the gas to tap, the Chief having become certain that a sealed reservoir lay behind the wall of the cave in which we had taken the sample, and this meant the buying of rock drills and piping. For utilizing the water of the fall we needed hydraulic mains, turbines and dynamos. Plant for the machine-shop was the next consideration, with small motors for the lathes and so forth. We had to have cement for bedding down the engines. And, finally, we needed agricultural implements, seeds, potatoes, so that we could cultivate enough land to supply vegetables for the crews of the airships when they should arrive at the plateau.

To the task of collecting all this mass of material, Lippencott applied himself with a devotion and energy which even his lackadaisical demeanor could not disguise, and he was the means of putting two of our best officers in our way.

"Seton," he drawled at me, "I have a young brother who could do with having the edge of a pretty large deviltry rubbed off. Could you find a place for him in your crew?"

"Let me have a look at him, Lippencott," I replied. "You can understand that I must make no mistakes in my men?"

"Sure," said Lippencott, and stretched a lazy hand for the telephone. "Dave," he said when he had the connection, "just look in here for a moment. I want

you to meet Commander Seton. Contrive not to be arrested for speed on your way here."

"Speed fiend, is he?"

"And then some," said Lippencott. "But Dave's no hog. He's a wizard at the wheel, and so far hasn't killed even a chicken. Drove a French ambulance because he was too young for the army."

David Lippencott was a slim dark young fellow, with deep-set eyes, perhaps a little too close together for frankness, but his mouth was large and good-natured. He had the same appearance of languor as his brother, but a glance was sufficient to show that his quality of muscle was of the stringy, untiring kind. I liked him at first sight.

"Yes, Commander Seton," he said, when after an hour or two of his company I put the thing to him, "I'd like to join you. But I'd like you to give a friend of mine, Steve Curtis, a chance of joining, too."

"Good man, is he?"

"You bet—and can keep his mouth shut, too."

"You'll like Steve," his brother affirmed.

Thus, before I had been in New Orleans two days, I had enlisted the services of three good men, including Travers Lippencott, our master of supply.

Steven Curtis was a fair-haired sturdy young American, short and wide shouldered, with a voice, I discovered, that might have charmed the heart out of a brass Buddha. He wrote his own verses and composed his own tunes, and sung them to an accompaniment on the guitar. He also could whistle as I have never heard man whistle in my life. These gifts, it will be understood, were valuable assets where it was contemplated to keep men away from civilization for some years. In addition, Steve was like young Lippencott, given over heart and soul to internal-combustion engines.

My visit to New Orleans saved me much time, for there through Lippencott I heard of a small river vessel being offered for sale. She was old, but in good condition, a motor-ship with twin engines of the Diesel type. She had started life as a steamer on the waterway on whose banks she was built—the Clyde—and had afterwards been converted to internal-combustion engines. Under thirty metres in length, not too broad of beam, and drawing slightly over two metres loaded, she was just the kind of vessel that I had hoped to purchase in Britain and bring over the Atlantic on a false bottom. I bought her, through my master of supply, and gave orders to have her altered for carrying cargo.

As Lippencott and I turned ashore from our inspection of the little vessel, and paused by the gangway in talk, a strange figure seated on a bollard close by came gradually into our consciousness. The figure was strange because it was foreign to the atmosphere of the place. A very stout man it was who, regardless of the heat of the day, wore a thick blue pilot jacket.

He was smoking a rakish and slim clay pipe, beautifully colored, and with a rugged thick hand on either knee he was gazing at the ship and us with an air of placid contentment. Now and again, by a slow movement, the pipe would be removed to permit of expectoration over the quayside, the hand would return to the knee, and the bovine gaze would come back to the little steamer and to us.

There was something so familiar about the placid stolidity of the mountainous figure and the contrasted fragility of the slender clay pipe that for a moment I thought I was dreaming. I crossed over to the bollard and stood in front of the man. Then with the same placidity the amazing unprehensile clump of fingers of one hand were stretched out to come slowly to the peak of the cap, and the huge figure slowly rose. A deep husky voice rumbled up from vast depths.

"Commander Seton, sir," it rolled. "Gi'e ye a good day, sir."

"Bless my heart and soul!" I exclaimed. "It's Smithers!"

"Aye, aye, sir! Smithers it is, sir—as wus with you, sir, on the cruiser *Dorset*. Happy to see ye so 'earty, sir!"

"You're pretty bobbish yourself, I should think?"

"Aye, sir. Tol'rable bobbish, thankee kindly, sir."

"And what are you doing in New Orleans, Smithers?"

He hoisted back his big shoulders, and brought his ox-like eyes into a fixed stare at me.

"Like this, sir," he rumbled. "I was second-class warrant shipwright on the *Orleans* arter the wawer. I j'ined 'er, sir, arter you got to flyin' like. An' w'en they retires me—as in the course o' natur' they was bounter do—not 'avin' any womenkind like, an' thinkin' wi' my weight as settlin' down would make me 'eavier, I makes up my mind, jest for somethin' ter do, like, ter go round an' visit all the places as the ships I been on wus named from."

He paused for a breath, and to take another hitch, as it were, on his wall-eyed gaze.

"The *R'y'l George*," he explained, "wus easy. They's a little pub down Barkin' way o' the name. I 'ad a bit o' trouble ter find the *Minotaur*, but I comes on another pub o' that name outside Davenport. I finds *Arethusa, Good 'Ope*, the *Lion, Intrepid, Marlborough*, wi' difficulty more or less, but I finds them—pubs mostly. Cur'ous fact in natur', sir, as so many of 'Is Madgesty's ships should be called arter pubs, ain't it, sir?"

"Extraordinary!" I agreed, for I wanted to hear the end of this peculiar Odyssey.

"*Dorset* wus easy. I just goes down ter Weymouth an' 'as a quart at the Anchor, for the sake o' old times, so to speak. The *Téméraire* wus bothersome, but I gets down ter Demerarar as bein' as near as I could find. *Orleans* brings me 'ere—though I done the French one, too, to make sure, but she was a new ship, an' I'm goin' ter do the *Amason*, sir, 'n' then I'll be finished."

"And what then?" I asked.

"Then, sir," he said impressively— "then I'm goin' ter find a quiet retired spot w'ere I can just sit an' think—or mebbe not think at all if I like."

"Would you take a job that would give you a chance to sit and think from me?"

"Ah! I'd take *any* job from *you*, sir!"—very pointedly.

"Right. If you'll look after this steamer for me until I get back from England, I'll take you to the Amazon and find a quiet spot for you there."

So I secured Sleepy Sam Smithers, a very important cog in the mechanism for a time, as you shall learn, and I pictured with some amusement the delight of Higgins and Grumstock when they found their old shipmate joining them.

I now left the work in New Orleans in the hands of Lippencott, with his brother, Steve Curtis, and Smithers to help him, and set out for England, where I hoped to recruit another half-dozen men from among tried comrades.

Back to the Plateau

ALMOST the first person of my acquaintance whom I encountered in England was the young Marquis of Devonridge. He was coming down the steps of the Wanderers' Club as I ascended them.

"Hello, Jumbo!" he exclaimed, using the nickname my bulk has given me. "Got back from bug-stalking in the wild and woolly, have you? Got a good show of heads?"

"Fairish," I said. "Doing anything particular for the next three or four years, Pip?"

"I suppose the next three or four years will find me dodging the tax-gatherers, as usual. Why? Thinking of taking pity on a poor landowner?"

"I had thought of it, Pip. But I understood that you had sold all the Devonridge property?"

"Your understanding, my dear Jumbo," he replied, "has lost nothing of its limpid clarity. Except for a cottage or two given over to old servants, Devonridge is a barren title these days. If you're really game to take me out of this demagogue-ridden country, you may enlist my services for the next four years at the remarkable stipend of, say, ten shillings a week. That is to say, to wit, and *videlicet*: for five florins per week you may acquire a cook-secretary-chauffeur-gunbearer, warranted free from vice, clean about the house, faithful, willing, sober, industrious, surprisingly honest, and guaranteed to eat out of the hand! Do you go me, Jumbo?"

"I go you, Pip. Come and have lunch."

"Very good, sir."

And his lordship touched his hat obsequiously.

We had not much opportunity for talk during lunch. The Wanderers' was usually crowded, but after we had fed Devonridge and I strolled down to his rooms at the foot of St. James's Street, and there I outlined the scheme to him.

"My dear Jumbo," Devonridge said, when I had finished, "I'm on. *Ça va sans dire*—as the French always say in novels writ at Tooting. But I don't want you to take me on false pretences. The idea of stopping war conveys absolutely nothing to my young mind, except regret—if the scheme wins out—that we shall put a lot of honest lads belonging to my own class, and a Jew or so, out of a job. Natheless—did you mark the word, Jumbo?—*natheless*, I am with you, not out of any high-falutin' notions, but for the lark."

"There won't be much lark about it, Pip."

"Trust me to get some fun," he smiled. "But I'll hang on till you release me—and I'll do my best for my mob, you may be sure."

"I'll take you on those terms, Pip."

"Righto. And now I suppose you want more men?"

"My object in England."

"I can help you there," said Devonridge. "I know all the good men in London—and all the rotters, too."

Philip Bentinck-Scrope, Marquis of Devonridge in England and Baron Craigfeanteoch in Scotland, thus became my lieutenant while I remained in Britain. He was invaluable, for he enlisted the services of three young men of good family whom I knew by repute. They all had honorable records of service in the European War, two serving at sea and the other with the air force, and all of them had been wounded.

The last statement brings up an odd fact I was beginning to note. With the exception of the Master, the whole of the crew up to date had suffered from wounds taken on active service, and when I brought in three other men, two mechanics and an instrument-maker who had served on airships with me, the tally was not broken.

I need not enlarge on the characters of these men. Devonridge's three were of the gay and well-dressed, rather slangy type he represented, if I except one, a quite big young man named Billy Haynes, who had Sleepy Sam Smither's ox-like stare and no great gift of speech. My two mechanics I knew to be capable and trustworthy men, quite ready to be plucky if occasion demanded it, but with the fine mechanic's logical habit of reasoned speech and movement. My third, the instrument-maker, was a little slight man named Thetford, a perfect genius in the matter of the fine adjustments required by his trade. I knew him to be a man absorbed in his work, and a tireless worker.

In selecting these men, particular care had to be taken that they were without connections who would worry about their absence. With the exception of Thetford, who had a sister, none of the six could think of any relatives or friends who would be likely to get up a hue and cry for them if a reasonable yarn of exploration was spun. I arranged that money should be sent at regular intervals from New Orleans to Thetford's sister, and that he should write to her as if occupied in that city.

Within a fortnight of my arrival in England, I was on my way back to America with seven men.

Lippencott had wasted no time. The *Clutha* was ready for sea, and a good part of her cargo had been stowed. He had found papers to account for our voyage, and had created the Amazonas Exploration Company to account for our stores. We embarked young Lippencott, Steve Curtis and Sam Smithers, together with the English members of our crew, and under my command the good ship *Clutha* set out in fair weather for the Brazils.

Through the Jungle

WE made Manaos without trouble, for apart from Thetford all my men were more than amateur sailors and engineers. I did some business at Manaos, connected with the buying out of a moribund trading company, and we proceeded on our voyage upstream. By this business we made a good acquisition.

At a place high up the Negro, where it was joined by the waters of another river, there stood an ancient wooden bungalow with storehouses attached, which had belonged to the moribund company. Some distance above the compound the placid flow of the Negro was broken by rapids, impassable for any craft whatever, and below the compound, some kilometres downstream, the tributary tumbled into the Negro over shallow rapids that seemed to put any navigation of it also out of the question. But to a point not very far distant from the back of the storehouse, a creek ran up from the second river. It was only a question of a short portage, therefore, to get goods into flat-bottomed craft for navigating the tributary, and it was plain sailing—or as near plain sailing as was possible in such country—to tug barges right up *via* the Rio Innominata to the Plateau of the Scar. There were places, it is true, where we would have to get to work with spade and mattock to clear our passage, but on this point there was nothing that could not ultimately be overcome by willing hands. The trees lining the banks of the Negro's tributary and of the Innominata mostly branched over their waters, an arch of dense foliage which made the voyage one of half-light through the greater part of its length.

We berthed the *Clutha* by the bungalow and store,

and with the aid of her new derricks began to unload the stores. In this work, Philip, Marquis of Devonridge, sweated like any laborer of blood untinged by blue, and the three other men about town, Messrs. Haynes, Fitzalan and Greyson, as also the two American boys, Lippencott and Curtis, took their coats off and worked with equal zest. They were willing and handy beyond my dearest hope. Brooks and Dane, the two mechanics, threw themselves into the work with the cool precision of men accustomed to handling machinery all their lives, and their eyes gleamed over the fine pieces of plant they saw among the cargo. Little Thetford installed himself as tally-man and checked the invoices, while Sam Smithers took his great bulk to wherever it was handiest and, I imagine, began to have hopes of decreasing his weight by the violence of his exercise.

Smithers' chief job after the unloading of the *Clutha* was the putting together of two flat-bottomed barges, for, as indicated earlier, Sam had been a shipwright in his day. Until that task was accomplished Sam was in charge of operations, and his work was excellent. We had brought two small power-boats on the deck of the *Clutha*, and these were transported to the creek behind the storehouse. It was a matter of weeks before we had the barges on the backwater and our stores—or part of them—loaded into them. We would have to make at least two journeys before the whole of the *Clutha's* cargo could be got up to the caves.

Sam Smithers was left behind in charge of the storehouse and the moored *Clutha*, and at last had acquired the job where he could just sit and think. The prospect of weeks of isolation did not daunt the stout warrant officer in the least, and I knew that in the unlikely event of visitors, no enquiries would get past his tremendous placidity and bovine lack of expression. Sleepy Sam was our last link with the outside world.

Our voyage to the plateau was toilsome and arduous to the point nearly of torture. There was now no question of portages, as with the canoe. Time and again we were held up until we could clear our passage. We might move a fallen tree that lay across the river, no simple task where the tough undergrowth and silted weeds of years impeded us, only to find a kilometre further on that a similar task awaited us. We carved and dug our way with saw and axe and spade. Our skins and clothing were scratched and rent by thorns. Insects bit us, bloodthirsty brutes that they were, until our faces were swollen out of recognition. But we kept on, ever with commendable cheerfulness where my crew was concerned, and we tugged our barges behind us all the way. And after weeks and weeks of toil, the nine ragamuffins that we had become sailed into the cavern of the plateau with perhaps a trifle more dignity than our appearances were warrant for.

CHAPTER III

Building the Workshop

WE found the garrison of three in good order. The Master—if it cannot be said he was in good health, for he never was that—at least was his self-contained and indomitable self. Grumstock and Higgins grinned cheerfully, and took pains to tell me that they had never been so hard driven in their lives, nor had they ever met anyone for whom they would sooner work than for the Master. That they had been working was evident. The living-room floor had been levelled, and big windows had been hewn to the face of the north cliff. Space enough had been provided for over fifty men, and clean healthy barracks it made. The two seamen had become fair hunters, as witness the store of dried venison provided, which, with bacon from wild pig, had been cured under directions from the Chief.

The Master's laboratory now was well set out, and it only needed the instruments we had brought up and electric power to be as complete and up-to-date as any in the world.

The Chief welcomed his new adherents in a way that bound them to him at once. The tremendous personal magnetism of the man leaped out of its frail tenement to master them even as it charmed. He explained the possibilities of the cavern to them, and did not minimize the amount of work which would have to be done, but notwithstanding the starkness of his doctrine of labor he fired them with the romance of the scheme. If he promised to drive them hard, they welcomed the promise.

That night as we rested after the labor of our voyage to the plateau, Steve Curtis was not too weary to play his guitar and sing to us, or to whistle. It was a marvellous performance which enthralled my two seamen, Higgins and Grumstock, so that they were open of mouth and eye to an astonishing degree. The lilt of Steve's negro melodies was so haunting that the morning found every man humming or whistling at his work. A good sign, I thought.

The Chief looked in at the concert and stayed a little, then went back to his work. I found him in his laboratory before going to bed.

"Ah, Seton," he said. "I am glad you looked in. Your crew is distinctly promising. I like that boy Curtis with the guitar. He is an acquisition. And the rest seem good metal. I congratulate you—and myself."

"I'm glad you're pleased, sir."

"The little man—Thetford, is it?—he has skilful hands and intelligence—"

"That's our instrument-maker, sir. I think you'll find him useful in the laboratory."

"I am sure I shall, if I am any judge of men. Good-night, Seton. You have done well."

Next morning was devoted to unloading the barges. We landed the various pieces of plant as near their ultimate bases as we could; the oil-plant to its proper cave, the machines in their shop, the instruments by the laboratory.

When the unloading was done, the whole gang with the exception of the two mechanics, Brooks and Dane, and Thetford, went off under the charge of Devonridge to fetch up the remainder of the stores, while my men concentrated on fixing a temporary electric supply to the laboratory. The power for running the dynamo we got from a small petrol engine, and both these we bedded on the solid rock with deep-set bolts and concrete. The accumulators and transformers for bringing the voltage up to the high figure required by the Chief for his work we laid down in a little cave near his laboratory.

This work occupied us two or three days, but we finished it to the Chief's satisfaction, who then took Thetford into the laboratory and became deeply absorbed.

The measuring up of the caves and the setting out of the plans for the machine-shop, the dynamos, and the turbines were our next task, but Brooks, Dane and myself had much of it finished, with several of the machine-beds levelled and drilled for the bolts, before

the barge party returned with the remainder of the *Clutha's* first cargo. Some of the plant now arrived was heavy, and we were obliged to cut down large trees and float them into the cave to make sheers for lifting it. We economized effort by lifting the heavy pieces right to their beds.

Our most difficult task was the setting of the mains for the turbines, but we managed it by constructing a strong flume of wood to divert the stream from its course a little, so that we could work dry-shod in its natural channel. By dint of hewing out portions of a side tunnel from the stream, we secured an excellent setting for the hydraulic mains, and these were conducted to where the turbines were conveniently placed at one end of the workshop floor.

We were fortunate in the matter of concrete. The rock of the cavern was free from clay, and had nothing in it to hinder the close and strong binding of the cement. The Chief selected our quarry for us after sampling the stone from several of the minor caves. Our stone-breakers were Billy Haynes and Devonridge, the latter insisting he was fully qualified for the job by being able to sing one song called "Stonecracker John." He sung the ditty as he did his work with such unremitting ardor that even the monosyllabic Haynes was moved to profane eloquence.

It was necessary that all the heavier work should be done before the company was broken up for a further voyage to civilization. We ran out of cement, for example, and certain of the plant had not been at New Orleans when the *Clutha* made her first trip. But months passed before we had the turbines in working order with the big dynamos sleeping beside them, or had all the machines laid out with their motors and switches.

Yet, when I looked along the cavern and saw the water gleaming under the blaze of powerful arcs, the array of machines under their covers, the waterfall harnessed to our use and the dynamos converting its power, I found it strange to realize that over a year had passed since I first paddled into the cavern. Much had been done in the time, and the days had flashed by on swift wings—all the more swift because the work had held us happily absorbed. I could say, with the Chief, that we had done well. But we had only made a start even then.

An Amazing Discovery

IF the work done by the mechanical and laboring section of the crew could be fairly commended, the brain of the community had seldom slept. In the laboratory, with the help of the now enthusiastic Thetford, the Master had been working out many of our problems. In my spare time I had started to design an airship, and had made working drawings for its construction. To this the Chief bent very frequently his trained and fertile mind. He brooded over my drawings, correcting them here, adding to them there, and there was not a stroke of his pencil but outlined some amazing idea.

He would concentrate on his own problems, which were many and varied, and for relaxation he would walk out of his laboratory to make clear some difficulty of the working gang. Thetford worshipped him, and would slave with the tools of his trade far into the night on the models and instruments conceived by the Chief. A nod from the Master was sufficient to make any member of the crew call up the last ounce of energy for his service. But though the Chief drove us hard, it was always by his example and never by a word. And he drove himself harder than any.

There were times when we would not see him for days on end, when we would watch little Thetford creep to his bed exhausted night after night, and would know that the Chief had not sought sleep in all the hours. These periods were anxious for me and for all of us, for I knew with the others that the agony of the terrible burns on his tortured body robbed him of the slightest chance of rest. Our dread was that his spirit would break under the strain.

I remember one night when sixty hours had passed unbroken by sleep for the Chief. Eleven of us sat silent in the living-room, while Thetford sprawled exhausted on his bed, and we had not the heart even to play cards. We whispered among ourselves, praying in our hearts that our leader could relax and find rest. And suddenly he stood at the entrance to our cave.

His face was calm and placid, and his mild blue eyes, deep sunk though they were in his beautiful face, were full of something like a gentle wonder. He nodded to us with the strange little gravity which was his nearest approach to a smile, and he stepped into the chamber to cross to the sleeping Thetford.

"Thetford's asleep," he said. "Lucky Thetford! But he drives himself too hard, poor fellow. A good man!

"Who was it injured his hand to-day?" he asked, as he turned to us.

It was Greyson, who had had his fingers crushed under a heavy weight, but he hid the damaged hand. I knew that the reticence would not suit the Chief, so I nodded in Greyson's direction.

"Greyson, was it?" said the Chief. "Let me see, Greyson. Yes," he said, as he examined the damaged fingers, "you have given yourself a bad crushing, Greyson. No bones broken, however."

In spite of his pluck Greyson shivered a little.

"Yes. It must be painful—and pain is hard to combat," the Chief murmured—he who could combat it so! "Come, let me dress it for you. I have a lotion—"

He crossed to the rough cabinet where we kept our small store of drugs and so on, and took out a bottle. Then with infinite tenderness he dressed the hand—with the five fingers left him to execute the mercy.

"I am rejoiced to tell you, gentlemen," he went on, "that I believe we can carry out our campaign without the shedding of blood, without taking life. I see your work, but you see nothing of mine. I must tell you that I have discovered a gas which will cause sleep for a number of hours."

He went on to explain the anæsthetizing gas which was afterwards to give us of the League such power. The men livened up to the interest of it, and he suddenly turned to Steve Curtis.

"You do not sing and play to-night, Steven," he said. "Why do you neglect your guitar?"

"Chief!" Steve choked in exclaiming. "You haven't slept for three nights. I—I—didn't like—"

"I don't think there is profit in watching me, Steven," the Chief reproved him gently. "You must not do it. Come, sing. It will not disturb Thetford. Sing the little song about the lonely cabin."

Steve reached for his guitar, and though he quavered over the first lines, he soon found his voice:

"Li'l ole cabin in de cawn-patch,
Shingles all a-droppin' from de roof,
Look lak eveh'body gone away
Some place wheh dey's gone to stay.

"Lovin' ole Mammy, wheh is yu at?
Kindes' ole Mammy, is yu daid an' gone?
Why did Ah leave ma home an' run away
From de li'l ole cabin wheh Ah was bawn.

"De's no smoke risin' from de kitchen flue,
No light shinin' froo de do'.
Nobody home to welcome yu,
But what's dat creakin' on de flo'?

"Lovin' ole Mammy an' ma Daddy, too,
Is yu daid an' gone from me?
Oh, why did Ah up an' run away
From de kindes' ole Mammy Ah will evah see?

"Empty an' sad—not even a houn'—
Do' standin' open—done broke de latch—
Think Ah'll be goin' an' not stay aroun'
De li'l ole cabin in de cawn-patch!"

"Excellent, Steven!" said the Chief. "You excel yourself. Don't ever lay your guitar aside because you think I have not slept. I like to hear it. I am grateful, indeed, when I hear it. Come, Seton. I have to show you something."

I followed to receive a gentle wigging for allowing the boys to be disturbed about him.

"Now, my dear fellow," said he, when the wigging was over. "I want to show you what I have found in the gas which you sampled for me some months ago. I have had many samples since. You understand how helium was discovered, I take it?"

I nodded.

"Then I need not explain the significance of the lines in the spectrum?"

"No, sir. I understand that roughly."

"Very well, then. I will show you the lines which are given by the gas from our cave."

He had an elaborate arrangement of tubes and instruments set out on a low table, and a sort of magic lantern focussed on a white screen stretched over a wall of the cave. There came a crackle from one of the tubes and an intense, eery light. He touched my arm and pointed to the screen. There, projected on the white surface, was an elongated oblong of rainbow colors, broken by brighter and darker bars.

"Look at it well, my dear Seton," the Chief said quietly. "You see before you the spectrum of a new element—an element that may well upset the existing periodic table of the chemical elements. It is our gas, mixed with helium. The bright yellow bar to the extreme left is the characteristic D3 bar of helium. But this is new—quite new."

He touched a switch and the bright patch on the screen disappeared. He turned up the laboratory lights.

"I am now faced with the usual difficulty in a new science, of using old terms loosely to fit new ideas," he said. "The atom as formerly understood is gone. But let me put it loosely. Our new gas resembles helium absolutely in chemical nature in so far that it has no power of combining, and exists free, as single atoms, without having the ability to form any compound whatever. Since I judge its atomic weight—another misnomer, Seton—its atomic weight to be .145 of that of hydrogen, which up to now has been the lightest element known, you will understand what a revolution our discovery will cause in scientific calculation!"

CHAPTER IV
The Gas Reservoir

THE discovery by the Chief of the new element, which he named *aithon*, led me to think that the design of the airship as set out would have to be altered, but he declared that any drastic change would be unnecessary. I had designed the vessel to have its lift from helium. Our leader had proposed to manufacture that gas by passing electricity at an extremely high voltage through certain of the rarer metals—from the wolfram-type ores, I think—which he was positive abounded in the volcanic pipe we called the red scar. But the finding, first of the helium in the gas cave, and, second, his discovery of the new gas *aithon* in greater quantity than the helium itself, had laid open the possibility of an easier method of securing our lifting power.

We shelved all other work for the time being but the tapping of the reservoir from which the Chief believed that gas percolating into the upper cave was drawn. We could see that the gas in the cave had means of getting out above, but its lower fringe varied little day by day, which seemed to indicate that the escape overhead was continually being made good by fresh supplies.

The gas in itself was harmless. It was only its ousting of the necessary oxygen for breathing that made working in the cave an impossibility. We therefore took steps to fan the mixture of helium and *aithon* from the cave, and to keep a constant supply of oxygen—procured by the Chief from electrolysis of the cave water—circulating in it.

We brought up loads of concrete into the cave, sacrificing for the moment the stuff intended for damming the oil-reservoir cabin, and we bound it thoroughly to the thickness of half a metre or more into the cave wall by steel bolts and dowels. When this concrete was set, we found that we had stopped the percolation of the gas into the cave, so that the fans and oxygen were no longer necessaty.

In the concrete wall we had bedded a capped pipe with a side stop-cock to a pressure gauge, and through the aperture, of which the hinged cap lay back with its bolts ready, we inserted our drill to the rock wall of the cave. For the drilling our power was derived from a small electric motor bolted to the cave floor, and was led to the drill by a flexible armored tube on the Bowden wire principle. Of this process of drilling I had but slight knowledge, as had the other members of the crew, but with the theory of the business which the Chief apparently had at his finger tips, and with the natural handiness of the seamen and mechanics, we made shift to achieve something of a job.

Towards the end of our drilling, the gas began to creep through past the drill, and we had to cap the pipe and lay off until we could make arrangements for clearing the cave. The Chief contrived to have two oxygen helmets made for his and my use in an emergency.

Drilling was resumed with the fans going and oxygen blowing into the cave, and it soon became apparent that we were nearing the inner side of the reservoir wall. From the amount of gas now streaming into the cave, the Chief anticipated an enormous pressure, so I had a long crowbar reeved through the ring of the cap in readiness.

It was well that we did so, for suddenly the drill broke through the rock, toppled with a thud first up against the concrete, and then was knocked back on its tripod over to the other side of the cave. The gas whistled out into the cave at enormous pressure, its force as strong as a typhoon.

Fortunately I am a very heavy man, or we might have had disaster. I was wearing the oxygen helmet, as was the Chief, so I sprang for the cap of the inset pipe and threw my weight on the lever. Slowly the cap went over, though it took me all my time, as the phrase is, and every muscle in my body was protesting

at the strain. The Chief was by my side, and he slipped the hinged bolt back into its flange, then calmly stopped to pick up and hand me a spanner. I screwed the bolt tight and the rest was easy. There were two more bolts, but they only had to be slipped through their holes and screwed home. We had the cap on and the gas was harnessed.

We now had to turn our attention to one of the drillers who had been overcome. It was Brooks, knocked over by the thrown drill. The others had managed to scramble out of the cave. I picked him up in my arms and carried him into the clear air, where the Chief attended him. He quickly recovered, and though he was a sick man for the better part of the day, he made light of his experience, saying that not many people could boast of having been nearly drowned on dry land.

When the gas was clear of the cave, the Master and I went back to find what pressure we had, while a number of the men trooped after us. There was the faintest suspicion of a gleam in the Chief's mild eyes as he turned the handle of the stop-cock to the gauge. The hand of the dial trembled violently, then swung to forty atmospheres indicated, where it remained steady!

"Forty atmospheres!" the Master said quietly. "A great reservoir. Ah, Seton, it is almost sacrilege to tap it—the product of nature's slow process through æons of time!"

Designing the Airship

AND now a trip to the outer world became urgent. We were short of the stores and plant made necessary by our development of the cave's resources. Again, we had to complete the airship design in the light of the new gas. The Chief made tests of a sample drawn straight from the reservoir and found it to be almost pure *aithon*. The specific gravity of the mixture he declared to be close on five times less than that of hydrogen, so that with our design for a helium-lifted ship our margin for play was enormous.

In the original design, the total fixed weight worked out at about thirty-five thousand kilogrammes, with a disposable lift of under twenty thousand. The small proportion of disposable lift to total fixed weight was due to strengthening of the structure, and the sacrifice of carrying capacity to that end. It was not anticipated that we should have to carry heavy armament or bombs, or that sort of thing, or a very numerous crew.

With the advantages of the much lighter *aithon*, I urged the Master to permit a further stiffening of the structure, and he agreed. We thus avoided the weaknesses which have always characterized even the best of rigid dirigibles. The length and mould of the vessel we did not alter. She was designed to two hundred metres in length over all, twenty-three metres in diameter, with an extreme height of twenty-seven.

In cross section she was twelve-sided, and floated with one of the facets as a broad keel. This gave her a flat top and two vertical facets, one on either side. We joined the angles of these horizontal and vertical facets, each to the angle squarely opposite, with latticed girders of duralumin, so that the structure of the vessel was in fact a broad hollow girder of cross-shaped section through all her length. Her body was short and parallel, with long rounded bows and an extended tapering stern, the duodecagonal section being held throughout.

The cross-shaped section of the longitudinal girder permitted the running of a chamber, seven metres wide, from the point where her bows began to round to that where she began to taper to the stern, a length of ninety metres. On the main gangway, or keel, level, this chamber was divided off as follows, from fore to aft: first the room holding the control connections from the navigating cabin which was suspended below, the two being joined by a ladder; next two sleeping cabins side by side intended for the Chief and myself; behind these cabins, further aft, a bigger companionway ran down into the navigation room; next a space leading into an alleyway which had cubicles on either side to the number of fourteen, each cubicle taking two men and being provided with two low berths and two lockers; next came the engine room with the power for working the gas taps and so on, for raising and lowering a gondola to and from the main structure of the ship, and also for creating the enormously high voltage electricity necessary for some of the Chief's marvellous instruments; here also a stairway gave access to the observation top, and two doors led out to the amidships power units, one on either quarter; behind the engine room was a dining-saloon and lounge for the crew, with a stair down at its after end to the stern engines and control cabin. The galley and larder stood over this companionway.

Aft of the forward navigation cabin, two power units, port and starboard, were suspended. The engines here were 700 h.p. each, of the horizontally opposed cylinder type, with direct drive to the propellers. They weighed just over half as many kilogrammes as they had units of horse-power, and they were so arranged, each in its own little engine room, that the attendant mechanics could easily get at them.

The amidships engines thrust at the level of the main gangway, thus about four metres higher than the forward engines. They were also much wider apart, being about sixteen metres from crank to crank. These engines were of similar weight and horse-power to the forward units. The after control-cabin had two engines behind it, thrusting on the same lines as the forward ones. The whole of this after cabin swung horizontally on a pivot, engines included, on a strong column flanged on roller bearings, the idea being to hasten the turn of the ship by the side thrust of the propellers astern. The swing of the after cabin was electrically controlled from the forward one, but it was possible to work it from itself. The only thing not affected by the swing of the cabin was its binnacle, which was fixed to the stationary column on which the cabin pivoted, thus the lubber's mark of the gyro-compass always pointed to the real head of the ship. This old idea of steering was augmented by an ordinary rudder.

For the normal climb and descent we had the usual box-fins astern, but the genius of the Chief found us a much greater power in this direction. I anticipate the chronology of the story by telling of this feature at the moment, but it may be as well explained here as later.

We liquefied the *aithon*—at absolute zero—and carried a big reserve in steel containers. Owing to our immense lifting power we were able to have spring hoops for keeping our ballonets rigid, each being fitted with an automatic pressure valve. By an elaborate system of pipes, stop-cocks and valves, all electrically controlled from either navigating cabin, we were able to clear these ballonets of gas or air at will. When we wanted to rise quickly, we pumped the air from the forward ballonets, and forced into them the *aithon* expanded to gas by having been sprayed into a slightly heated chamber. Thus we upset the balance of the

ship, and had the lifting power forward—helped, of course, by the thrust of the propellers. By turning a graduated dial in the cabin we were able gradually to fill the ballonets one after the other, or empty them, fore to aft, or aft to forward, as we chose. Thus, when we wanted a quick descent, we emptied the forward ballonets of gas and filled them with air, bringing the nose down.

By reason of these improvements, all made possible by the discovery of the *aithon*, we were capable of—and the structure permitted—quick maneuver which would have buckled the ordinary dirigible at once.

Smithers' Toucan

IT was my task to set out working drawings of the improved airship. This was a matter of enormous labor for one pair of hands, involving as it did a mass of drawings and tracings to various scales from 1 mm. to 1 cm., and full-size for certain details. Owing to the shortage of material, which could not be remedied until the drawings of the airship were ready to pass into the hands of Travers Lippencott at New Orleans, the crew had time on its hands, so I enlisted the services of Dave Lippencott and Fitzalan, who I found, in addition to being capable engineers, had some idea of mechanical drawing. They acted as tracers for me. They improved as they went on, and the time came when the close inspection of their efforts by the Chief, Thetford and myself, could find no errors either in drawing or in figuring.

While this work was in hand, the remainder of the crew began to try drilling for the oil with an electrically driven rotary drill. They succeeded in striking oil at a depth of one hundred and thirty-three metres, and, as with the gas on the opposite side of the main cavern, found an enormous pressure. It was a good quality of oil, pale sherry brown in color, and not at all the tar-colored, viscous stuff one expected to see. It had a paraffin basis, and readily ignited as it was, fresh from the earth.

The voyage to the outer world could no longer be postponed. The drawings of the airship were ready, and we needed the piping for gas and oil, and had to bring up the refinery plant.

Of the company, only the Chief, Thetford, Devonridge and Haynes—which last two were promising themselves some hunting in the slack time—and Grumstock were to remain behind. Grumstock came with us for the first part of the journey.

We found Sleepy Sam Smithers as placid and contented as ever, to the great glee of Higgins and Grumstock, who found much amusement in chaffing their old shipmate. In the months that Smithers had been solitary, not a single white man had he seen. He had captured and tamed a toucan, and the bird was his sole companion.

I had been rather anxious about Smithers, whether his resolution and phlegm would indeed be capable of sustaining that dreadful isolation, but I honestly believe even now that the stout shipwright really enjoyed his own company. His health was excellent, a remarkable thing in a man so short-necked. He had improved the storehouse greatly inside, but had carefully neglected all outward appearances. The place was desolate and overgrown to a forlornness that might have made the heart sink, and even the *Clutha* was hidden by creepers. But if Smithers had allowed her to hide herself naturally, he had looked after her, waging bitter war on the ants which might have eaten into her timbers, and keeping her engine-room a picture of tidiness.

When the *Clutha* was ready for her trip downstream, Grumstock offered to bear Smithers company for a day or two before returning to the plateau.

"Well, Jack," said Smithers, "if you likes to muck in wi' Nosey an' me for a day or two, good an' well—you're welcome. But we ain't no debatin' sassiety, 'im an' me, I can tell you that."

Nosey, of course, was the toucan.

"Well, what do ye do with yourself all the time?" Grumstock demanded, with an irritated scratch of his head.

"Nosey an' me," said Smithers solemnly, "we've brort thinkin' ter wot ther papers calls a fine art.

"That bird," he went on with an impressive wave of his slim pipe— "that bird's a wonder. 'Im an' me'll sit fer hours lookin' at each other—thinkin', d'ye see?—an' I've seen Nosey that pensive as'd make you say 'e 'ad brains in 'is beak! 'E'll sit there, thinkin' an' thinkin' till ye begin ter wonder wot tremenjous idea 'e's got. You can see it swellin' up in 'is 'ead, then, sudden-like, 'e'll give 'isself a dust under ther wing. An' anybody can see 'e's got *that* point settled all right. Ah, Nosey's got me beat for thinkin', any day o' ther week!"

"I'd say a monkey'd be more company," Higgins asserted.

"Ah, Tom, ah!—fer *you!* Birds of a feather make good company," Smithers said pointedly. "A monkey's got no brains an' 'u'd suit you splendid. Nosey's my mark. 'E's got plenty."

"Oh, all right, Sam," said the abashed Higgins. "If you fancy old Solomon Levi as much as that, good an' well. But a bird like that'd give me the creeps."

"Possibly, Tom, possibly," Smithers said with solemn pride. "A bird like Nosey wants some livin' up to."

"I'll stay for a day or two," Grumstock announced, "if only for something to laugh at."

"That's right, Jack," Smithers said placidly. "Stay an' advertise your vacant mind as much as ye like!"

His withers quite unwrung by this peculiar extension of hospitality, Grumstock elected to remain, and he and the stolid Sam saw us drop down the river one morning early. The last glimpse we had of the pair showed Sleepy Sam sitting like a graven image on the steps of the wharf, hands on knees, gazing fixedly downstream after us, while Grumstock, beside him, was regarding his old shipmate perplexedly and was scratching his head in a state bordering on despair.

Further Equipment

WE reached New Orleans in good shape, and found Travers Lippencott with a cargo ready for us. This included our refining plant for the oil, piping, tanks for the pure spirit, and in fine the last of the material apart from the airship itself. There was also a large amount of food, tinned and otherwise, cement, grain—and, when we were ready to return, coops of chickens and ducks.

I handed him the airship drawings, and fixed a date for our return to pick up the parts. We arranged between us that the parts and the materials should be invoiced to a so-called North African Aerial Transport Company, and that the manifests and bills of lading should be made out for some of the North African ports. We built up a ramified and intricate deceit, not because it would have been difficult to get clearance for our cargo, which was innocent enough, but to hide our traces beyond recovery when the hue and cry would be

raised against us perhaps years hence. At the time when the parts of the ship were ordered, there was a great boom in the building of dirigibles in America and Europe, and we anticipated no trouble in having the orders filled. But to make assurance sure, and to see that every single part was submitted to accurate testing, I asked Brooks to stay in America until everything was collected at New Orleans.

Brooks was a little chagrined at the prospect of banishment from the plateau, but I pointed out to him that there was nothing left in the cave but rough work, or jobs that he could not tackle, until we could have the parts of the airship brought there, and he consented. He was a good man, Brooks, who was not likely to get drunk or talk, and he was thoroughly capable of the business of seeing our orders properly carried out. He was to draw upon Lippencott for money —we treated him generously—and in the end I imagine the prospect of travelling importantly about the United States rather took hold of him, for he set about the business with apparent pleasure. He was primed with a clear-cut and circumstantial story to trot out to enquirers, and we even went to the length of printing prospectuses of the company for him. This point was a trifle overdone, for though the scheme outlined was of the maddest, I believe he had difficulty later in keeping people from trying to invest in it.

The two New Orleans young men, Lippencott and Curtis, made the most of their leave from the Amazonas Exploration Company, and trotted their fellow explorers, Fitzalan and Greyson, about the city in great style, to the evident edification of the latter. They roped in two other men for the company, one of them a young oil engineer from Texas.

At last, however, the cargo was stowed, and we set off on our return voyage. Less than a fortnight brought us off Manaos, and there we had a slight scare.

Off the city we were boarded by a Brazilian official who insisted on inspecting our cargo. But our papers were in order, and in the end, though I fancy he thought us a trifle mad, he thanked us warmly for helping to develop the resources of his fatherland. We sacrificed on him and his fellows a bottle or two of very sweet champagne, stored aboard for just such an emergency, and when we dropped them over the side into their own boat, I do not think they were in a condition to remember whether we were going upstream or down. We were shouting fond farewells to them, and they protestations of undying amity to us, even as our engines began to turn for the run up the river. Some weeks later the Chief was welcoming us and our new comrades to the Plateau of the Red Scar.

A Lesson in Mining

THE young Texas engineer, Lin Greensleeve by name, fell in with the idea of the League right away, and the other new comrade, Matthew K. Whittaker (he insisted on the K.), was little behind for enthusiasm. Both men had fought for America in France, and our tally of wounded men was unbroken by their adherence. Greensleeve pronounced our drilling and capping of the well to be quite professional, and waxed eloquent on the quality of our soil. He set about the erection of the fractional distilling plant, and ruled out as unnecessary our idea of forming a reservoir. He superintended the piping of the oil direct to the stills, laid down the tanks for the gasoline (as he called it), and when that was done took over the piping of the *aithon* to the hangar caves and to the site of our pressure and freezing tanks.

Meantime Matthew K., who understood what might be called raw lumber, had organized a party for tree-felling. Tall trees were felled and dressed down the river, and were towed by launch into the cave to make the stocks for erecting our airships. The putting up of the stocks when sufficient timber was collected fell to myself and the seamen of the company. I was inclined to drag that master shipwright, Smithers, from his splendid isolation so that we might have the benefit of his professional experience, but I forbore, and disturbed him and Nosey only once, when I sailed down to thrash out a knotty problem with him. We managed, however, without his personal supervision to put up quite a shapely scaffolding in readiness for the arrival of the airship parts.

In the midst of these preoccupations, Lin Greensleeve made a discovery which was the beginning of a series of thrills for us.

In the east walls of the main cavern, whence came our water-power and our *aithon* gas, running up close to the edge of the red-topped pipe a series of varying tunnels wandered, seemingly the dried-up courses of ancient hot springs. These bored up to the surface in several places, to end sometimes in high sinter cones on the top of the plateau. The sweet air of the caverns was due in measure to the ventulation that these passages brought about, for in many of them one could feel the rush of air.

It occurred to the versatile mind of Lin Greensleeve that if he could search out a separate passage and connect it up to the furnaces of his refining plant, he would be in possession of a natural flue, and save himself a lot of trouble. To this end, he dragged me off on a tour of investigation among those upper passages.

For hours we scrambled and crawled with pocket compass and torches through tortuous ways, checking directions and measuring distances. Among other things we discovered a good passage up to the top of the plateau, but that fact was temporarily lost sight of in the amazing find that followed.

Lin discovered his flue—to a certain extent. The only thing that prevented it from being an excellent flue was the fact that it came to an abrupt end underground. Lin, however, had his measurements—which were all out, owing to an unseen influence on his compass, as will transpire—and he was ready to wager that by hewing through for a certain distance he would connect up with another of the dried spring courses, and so have a good draught to the outer air by one of the sinter cones.

Since the idea was merely a fancy of his, and since the other members of the company had their own particular tasks to perform that day, he determined to carry out the operation by himself; but since Lin was one of the most cheerfully determined devils it has ever been my fortune to meet, and the most engaging companion withal, I volunteered to help him. I knew nothing of mining, but I thought it was not too late to learn a little.

Lin decided that it was useless to attack the barrier with the pick, for the rock was a particularly hard limestone, and, as he put it, the only method was by "a shot or two." We descended, therefore, to the store-cave for a stick of explosive, "or two," detonators and a coil, a drill and a forehammer, and other weapons necessary for the attack.

I now received my first lesson in mining. The little

chamber was stiflingly hot, for some reason, but we commenced operation undeterred. My instructions were to hold the drill while Lin smote it, and to turn it slightly after each stroke. How the man could deliver such blows in such a cramped position I am unable to say definitely, but I take it that for the hundredth time I was in the position of the neophyte admiring that precision which belongs only to the master of any craft. We—or rather Lin—soon had a goodly hole sunk, and into this he inserted the explosive with its detonator all prepared. He put in some sort of tamping, and we retired round a corner or two to where the coil stood ready in connection.

"Hug the wall, Seton," Lin ordered. "Now!"

He dropped his weight on the plunger.

From the cavern round the corners there came a dull roar, and a gush of hot air came rushing down the passage. I was hugging the wall according to instructions, but was almost dragged away from it. We were among particularly pungent fumes.

"Foof! Foof!" Lin spluttered. "This will soon pass away when the little draught gets down to it. You won't be poisoned, Seton—but it's derned unpleasant."

We waited some considerable time, but the little draught did not "get down to it."

"Funny!" said Lin. "I could have bet we'd be through. Wait a bit, then let's go and see."

We retired to the end of the passage above his refinery, and while we waited we smoked and yarned. When Greensleeve thought it would be safe we returned to the *cul-de-sac*. The place was blocked by a heap of rubble, which Lin and I started to clear away. When we had made a way to the shattered wall, Lin fell to flashing the light of his torch on it.

"My, my!" he exclaimed. "We're through to a dyke rock. Gentlemen, don't snigger! I didn't expect that. Well, here goes!"

He picked up the drill and he rapped the end of it against the blackish rock. It sounded hollow, and he turned a grin on me.

"I'm not sold," he smiled. "It's boss, as the Cornish say. Another little shot will do the business."

Again we fell to drilling. We set the stick of explosive and the tamping, then went back to the coil. Once more that hollow roar, the rush of hot air, the pungent smell. But even now the expected draught was absent. Lin Greensleeve was puzzled, and his face as we made our way back to the entrance to await the dispersing of the fumes was a comic study in chastened expression.

"I can't be far out, Commander," he said ruefully when he caught me smiling. "We've driven deep—and it was hollow, too. Gentlemen, don't snigger! Maybe debris has fallen from the roof and blocked the passage. We'll soon have it out, if it has."

We returned to the scene of the explosion after another smoke. As we turned the last angle of the passage, Lin suddenly gripped my arm.

"Now, what's your verdict on that?" he demanded, and pointed ahead

From the further wall there rose a strange greeny lambency, silhouetting the heap of rock that was piled on the cave floor Something uncanny it was which made the hair prickle on the scalp. A strange sense of some appalling power behind the rocks gripped me hard, and I was fain to turn on my heel and run. That, indeed, was what Lin Greensleeve bade me do.

"Get back, Seton," he whispered. "Get round the angle of rock. I dare not think what it is—but I'm going to see."

"Stop, Lin, stop!" I exclaimed. "There may be fumes from it!"

"We'd get them now if there were," he replied, sniffing, "though there's an unaccountable whiff of bromine or chlorine," he added with a puzzled air. "Get behind the rock angle, Seton. I am going to see."

All in ignorance as I was, I could neither stop him nor permit him to go forward. I could not tell if it would be wise to follow him, but the Scot in me dictated the waiting attitude, to be ready to pull him out if he were in danger. Lin crept forward on his hands and toes, and came back in a rush with a lump of rock.

"If it's what I think it is," he panted, "I'm either mad or drunk—I don't know what I'm saying, Seton. I'm rattled. Let's get out of this. I have something that may provide a clue. The Chief is the man for us."

We hurried for the entrance of the passage and climbed down to the main cavern floor. We ran across the bridge that now spanned the lake, and rushed up to the Chief's laboratory. We were bidden to enter.

Lin poured out his story in a rush, while the Chief listened with his usual mild expression—unastonished, unmoved.

"A lambent, greenish glow," he murmured. "Let me see the rock."

Lin took it out of the coat in which he had hurriedly wrapped it. It was a blackish rock, with a reddish side to it, and to this reddish side there was a pinkish crystalline deposit, very thin.

"Pitchblende, I think, with a filling of rhodolite," said the Chief when he had placed it on a bench to examine it. "An extraordinary combination! Look, my good Greensleeve—Seton, look!"

He charged an electroscope until the two leaves were held out at right angles to the stem. He put the piece of rock under the globe, and the leaves fell at once!

"That tells its own story," the Chief said. "Your specimen, Greensleeve, is highly radio-active—and the pinkish salt that clings to the rhodolite side of it is one of the radium compounds—I should say bromide, with a slight barium impurity."

He looked at us mildly quizzical.

"I have ceased to disbelieve in miracles, Seton, since we found the *aithon* reservoir. Though the glow you describe may easily be only the fluorescence caused by a minute quantity of radium acting on some substance readily so affected—radium, pure radium does not glow to the eye at least—the thin deposit of radium bromide clinging to the rock specimen makes me really believe you have come upon a natural pocket of the metal itself!"

CHAPTER V

Nearing Completion

IT is not for me, Sholto Seton, one-time commander in His Majesty's royal navy, and always more man of my hands than of the head, to venture an explanation of that marvellous polythalamous geological freak known as the Plateau of the Red Scar; nor is it mine to fathom the processes of nature which brought the treasures, culminating in the radium pocket, to the casual and groping hands of the members of the League of the Covenant. I am fain to rest content, as was my Master, that the gifts were there for our seeking, and to accept them with reverence in my heart. But to those who seek explanations—whether it be that the work of their lives bids them ask or that they are po-

sessed of an idle, if itching, curiosity—the slight notes of my Chief have been edited and amplified by men of science, and lie open to all who have the wit to understand.

The task that lay to my hand there in the heart of the Amazon forest was plain. I had to keep the crew cheerfully at work, maintain a real though carefully veiled discipline, and find ways and means for bringing the dream of the Master to realization; to second, in my blundering fashion, in a bewildered fashion sometimes, the working-out of the amazing conceptions of his untiring brain.

Of the concrete, then, I have the knowledge at least to speak fairly. Of the abstract and theoretical, I can only set down the results I saw. And with motives, personalities, characters, I must—to lapse wittingly into Scots—just hirple along.

It was like the Master to be concerned over the possible effect of the radium rays on Lin Greensleeve and me. The little man, who could not heal the great burns so far advanced on his own frail body, made both of us strip and undergo a medicated bath and ointment preventive treatment of his own preparing. For some time no day passed but that he would have us appear for examination.

Nothing, I am convinced, held terror for our fragile little Chief as concerned himself, but, under his habitual repose of manner, Lin and I thought we read a mortal terror for us. However that may be, in the end we were pronounced to be without scathe.

Members of the crew were strictly forbidden to enter the passage or go near the cave until we had taken steps to secure the contents of the radium cache, which the Chief on inspection declared to hold an astonishing quantity. We had no lead in the cavern, but one of the mechanics remembered that the floor of the *Clutha's* engine-room was covered with the metal, and some men were sent down to the wharf to rip it off and bring it to the cavern.

The Chief designed a leaden shield. This had two ingeniously jointed arms ending in box-like mitts, which permitted the handling of a little spade by one, and the holding of a thick lead case in the other. A view of the operation of case and spade was given by a periscope, and light was thrown on the subject by electric bulbs attached to the top of the leaden screen.

When this contrivance was ready, Lin Greensleeve and myself cleared away the debris on the cave floor, by working with spades from behind two lead shields. The debris was removed, the working screen was pushed against the aperture of the cache, and Lin, whose hands were more fitted in size for the box mitts than my great fists, spooned the precious salts into the case, and when the crevice was cleared the lid was dropped home. The treasure, worth an enormous fortune, was deposited in a little cave right in the heart of the cave system.

Lin Greensleeve now made a survey with proper instruments, and found the right spot for breaking through into the other passage. Within a day or two the passage to the radium cave was impassable by reason of the fumes from Lin's furnaces. He was not cheated, for when the dampers were up the roar of the draught through his furnaces rivalled the waterfall in filling every cranny of the caverns with noise.

The position of affairs with the League at this time was so:

We had, apart from the Master, sixteen men signatory to the Covenant for Peace—Devonridge, Greyson, Fitzalan, Haynes, Lippencott, Curtis, Greensleeve, Whittaker, Grumstock, Higgins, Dane, Thetford and myself—thirteen at work in the cavern. Outside were Travers, Lippencott and Brooks in America, Smithers at the storehouse downriver.

We had perfected the Chief's laboratory, harnessed the waterpower of the fall and provided ample electricity for all requirements; we had secured our oil supply, and were able to refine it and store the pure spirit and lubricating oils, and we had wax for our electrical instruments; the gas for lifting our airships was available in great quantity, and we were able to reduce it to its liquefying constant and to store it; our engine-shop, up to date in every particular, was in full working order; we had the building slips ready for the erection of the dirigibles; and we had the living accommodation for our full complement of fifty men all ready for occupation.

The plans of the Chief and his experiments were well advanced. He had standardized his formula for, and was ready to manufacture, the anæsthetizing gas. He assured me that he was nearing the end of the development of the power that was to bring the world into line with the ideas of the League. In addition to this, he and Thetford, as a relaxation for the Chief, had prepared numerous instruments for the navigation of our ships, and had made models of many contrivances for the controls and the manipulation of our lifting gas. Finally, we possessed a supply of radium greater than had ever been known before in the world, and worth enough money to set us all in luxury for the rest of our lives.

In the matter of creature comforts we were very well off. We had vegetables growing in a clearing down the river; we had fish and venison and wild pig, with occasional snatches of frozen beef and mutton; we had, of course, the best of canned foods, milk, meat and fruit; and we had ducks and chickens thriving in a cave at the south end of our main cavern—the ducks corralled by wire netting.

To reach this point in our preparation had taken over two years, and indeed we had celebrated two Christmas feasts and two Thanksgivings in the big living-cave of the plateau.

We had come to the stage once more when we would have to make a journey to the outside world. By now the materials for our two airships with the necessary instruments would be waiting for us at New Orleans, and we were due to complete the number of our company.

Before setting out on our last voyages, I put the whole of the men on constructing great doors for the main and smaller entrances of the caverns. These we made of trellis-work in heavy scantlings of wood, overlaid with wire nets, and we fixed floating boxes of soil at their bases, planting quick-growing creepers on them. We planted well past the hinges of each flap to a good distance along the cliffs on either side of our waterway. When we returned from our next voyage, the entrances to our caverns were masked with luxuriant foliage.

The Crew Complete

I TOOK Devonridge, Dane and Higgins with me to England for the purpose of recruiting men. Greensleeve volunteered to find some in America, as did the two Lippencotts and Curtis. We went carefully to work on both sides of the Atlantic.

In England, Dane did the best work among us. He found us six skilled mechanics for whose characters he could vouch. I found five good seamen and airmen

who had served with me previously, and Devonridge weighed in with two excellent sportsmen of his own type, and a couple of men who had been on his estates.

We each kept our own party and voyaged separately to New Orleans, where we found that Lippencott and his helpers had recruited sixteen good men. There was not a man among the whole thirty-one who did not promise well, and the experience of the next year at the plateau only found a single failure among them. Our total complement, excluding the Master, now numbered forty-seven, and still our tally of men wounded in war was unbroken. I had almost made a point of that qualification to my recruiters, and they seemed to have made much of it.

While my party was in England, Lippencott had had the *Clutha* loaded, but with the number of men we had to carry and the weight of our material, we found that at least two journeys would be necessary. It seemed hardly safe to leave any number of men to kick their heels in New Orleans for some months, so I determined to ship the lot at once. The little vessel was packed, but the spirit of the men was good and they bore the cramping with cheerfulness. The voyage was made at good speed and, except for having to hide the men on passing several of the river ports, we arrived at the storehouse without adventure.

There I gave over the command to Devonridge, with Greensleeve and Curtis as juniors, and when the unloading was done, I took the vessel without further delay downriver again for another trip to New Orleans. Here I shipped the last of our material, and a good amount of stores.

On my return to our base on the river, I found Devonridge waiting with men to unload. We carried our stuff upstream to the plateau.

I outlined a plan I had conceived to the Chief, which was simply that after two further voyages to America for stores we should burn our boats behind us, and not go back to the outer world until we could make the trip on the *Ark of the Covenant*. The Chief agreed, so when the final two voyages had been made under Devonridge, we ran the poor, trusty little *Clutha* into a creek downstream and felled trees about her, effectually concealing her where I suppose she lies—bless her!—to this day.

We shipped Smithers and his toucan, Nosey, having about broken their hearts by razing the storehouse and bungalow to the ground, and as we proceeded upstream, we put charges of giant powder under tall trees behind us so that they fell across the water, securely blocking any passage behind us. In a month or two the way would be nigh impassable.

Thus we cut ourselves off from civilization—except for that which we carried with us—and a full year elapsed before the world heard of us again. Even in the cavern we were shut from prying eyes, for the great doors were now a mass of green, and when we chose we could be very troglodytes.

The crew settled down to work with commendable earnestness of purpose, and we had trouble with only one man.

It must be remembered that our company consisted of picked men. We had some of the most skilled engineers, mechanics and electricians that could have been found in Britain or America, and in addition we had others who made up for their lack of skill by willing spirit and remarkable adaptability. The young men from about town, both British and American, where they could not do work in which they had been trained, took off their coats and worked like laborers.

Philip, Marquis of Devonridge, as an example, would take his ex-gamekeeper, one Moggs, off for a day's hunting, and would bring in enough fur and feather to keep the company feeding well for days; but next day would see his lordship on some rigging work, taking orders from Sam Smithers as cheerfully as he had given them to Moggs on the day previous. Moggs, too, would be found cooking an appetizing meal for the Chief—to whom he speedily became devoted—with the same amiable imperturbability as he had shown in tramping through the marshland after Devonridge. Moggs was a treasure, for he was the only man among us who dared argue with the Chief as to what was the proper time to eat and sleep. In room of Grumstock, otherwise engaged, he made himself an unofficial batman to our leader, cook to the company in general, and factotum at large about the caves.

Another mighty hunter in our midst was Billy Haynes. Haynes had fewer words than any man among us, not even excepting Smithers, and he never was upset, never ruffled. The only time we ever saw him show the slightest symptom of being moved was when Lin Greensleeve decried the merits of Billy's double-barrelled English sporting gun in comparison with one of the pump variety from America.

"That's a lot of dam' rot, Greensleeve," said Billy with his widest stare. "Talk about something you know—f'rinstance the smelly stuff you work in—and I'll listen to you."

Of Lin Greensleeve I have written something already. He was good in the way that only an American can be. Full of the humorous exaggeration beloved of his countrymen, he could "string," as he called it, the Britons among us with superb ease, and he had the knack of causing laughter, but when he settled down to work he tore at it and hammered at it with a driving force that was a thing for wonder. Young Lippencott, too, and Steven Curtis proved their value, the former combining a drawled wit with a steady application to business, and the latter with no less zeal in harness, and his delightful gift of song always available for our amusement.

Into the Air!

THE cement that bound us together was devotion to the frail little man who inspired us. He moved in our midst with a gentle aloofness which did not repel. He helped us in our difficulties, out of the deep store of knowledge in his amazing brain, and he tended us in sickness or injury with the extremest skill, though fortunately his ability was seldom called upon on the latter account.

In the hands of these willing comrades, and under the direction of our brilliant leader, the airships steadily grew into shape in their stocks, and at last the time came when the first *Ark of the Covenant* was ready to take the air and the second only waited the performance of the first to allow completion. I think more than myself experienced a thrill of sorts when that night the Chief and myself stepped into the recreation room of our company.

"I have come to tell you, gentlemen," said the Chief, "that to-morrow we fill the ship with gas—and to-morrow night we take the air."

The cheer that went up might have been heard over the Andes in Ecuador!

It was New Year's Eve and a night of bright moonlight that paled the tropical galaxy of stars. The *Ark of the Covenant* floated down the main cavern on

her own power. We had fixed taut cables crosswise over the walls and roof of the cave, so that she would rub against no rock surface. For a moment she hung steady over the entrance basin, then I nodded to the Chief, who was by my side. He gently pulled round the ascent indicator as I belted for half speed, and the ship rose smoothly by the head as we gathered way.

We shot up at a surprising speed, and on the instant I knew of a certainty that I was in command of the finest craft that ever sailed on sea or in air. She was a living thing, obedient, gentle, strong. We tested her thoroughly against the wind and with it, and her highest speed was well over three hundred kilometres an hour. Her balance was perfect.

We closed all apertures and turned on the compressed air, which was also fed to the engines, and we gave her full gas. We rose at dizzying speed, so that I began to have fears for our ballonets. We touched a height close on nine thousand metres, and the earth was lost to us. Higher we went, and it was certain that no known machine could reach us. Yet we found resistance enough for the propellers to cruise at a good speed. We knew that we were safe from all pursuit when we chose.

We came down again, and tested her for drift, for her turn. She drifted little, and with the help of the pivoted stern cabin she could come about almost inside her own length.

The Chief accepted the wonderful performance of the ship with the greatest calm, for I think he never had a doubt of her capacity. What concerned him more was the working of the various instruments he had invented for our use. First of these was the navigating globe.

This was nothing less than the earth in miniature. For its control the Chief had utilized not only the magnetic rays of the earth, but also in some extraordinary way the pull of the earth as it revolved on its axis. The ball, which was the earth in replica, thus was always poised in exactly the same relation to the ship as the earth itself. The globe swung on an elaborate system of gymbals, and its core was taken up by a series of magnets. The whole of this complicated piece of mechanism was enclosed in a gas-filled chamber, the top of which was pierced for a lens, through which the illuminated portion of the globe directly under was thrown magnified by a camera obscura on a vertical ground-glass screen. The ground-glass screen was crossed by two hair lines, their intersection giving the position of the ship over the earth, and the vertical hair her direction. To test the instrument, the Chief bade me fix my own course for some place recognizable, making my own reckoning, and he covered the ground-glass with a cloth.

I fixed on Caracas, and put the ship in that direction at full speed. On my mettle, I took no chances. I calculated drift and everything that might throw us out of our course, and when we arrived over the city and pulled the cloth from the indicator, the crossed hairs stood clean on the dot representing the place.

It was on a plain of the hills behind Caracas that I was first introduced to the directive rays which controlled the cloud of anæsthetizing gas, for here the Chief had a glass bomb filled with the liquid gas and dropped haphazard on the plain.

Below us the gas widened into a luminous cloud. The Chief was working with a box affair which had a sort of lens arrangement on one side and was connected to the high-tension circuit. He and Thetford manipulated this box through a hatch in the cabin floor. As I watched I saw the cloud take shape and move across the plain, now one way, now the other.

We were drifting on the wind with stopped engines, but the cloud was made to travel in advance of us or across our path at the will of the Chief. As I watched, I saw the cloud move toward a series of dots, cattle of some sort, on the plain. It enveloped them, and whatever they were, horses or steers, they were all lying on their sides when it had passed.

"It is enough," said the Chief.

"Have you killed them, sir?" I asked. And he looked up at me very mildly.

"Why, what a question," he said, "and from you, Seton! No, no, my friend, they are only asleep."

As he spoke, he moved the box back and forward quickly, and below the gas cloud was broken and began to disperse.

"That is well for one morning," the Chief said, rising. "Now, Seton, let us be back at the plateau with the dawn."

In the west the moon was low down, and darkness was spreading over the land. Below us no light gleamed, nor often did we catch the faint sheen of water, save only when we sped over the Orinoco itself. Darkness for a space, but for the light of the stars, and then came that cold tinge of grey in the east.

Quickly faded the grey into pale topaz and chrysoprase, until, as we slanted down to the basin of our cave, it was lost in the glory of the risen sun. Our trial trip was over, with abundant success.

The Deluge

TWO days after our initial voyage, we almost lost the first *Ark of the Covenant* as a total wreck, and a little later it seemed likely that both our ships would be damaged beyond repair.

The second ship still lay in her stocks, waiting for any improvements that might be suggested by the performance of her sister ship. We had taken out *Ark of the Covenant—I* on continued tests, and we had been cruising some hours towards the early evening, when, without warning, we were caught by a tropical storm at a considerable distance from our base. For the storm in itself we needed to care little enough—it would have been possible to ride over it. But we found ourselves in the air with only sufficient petrol for the home run. We had, moreover, no stores aboard to permit any comfort in waiting for the storm to die down. There was nothing for it but to run.

Behind us the storm was rising on a following wind, and it was a question of time if we could be at the cave entrance before the impact caught us. The ship behaved admirably, rolling little, keeping her balance, and speeding like a thrown javelin for home. We dropped into the entrance basin under a sky black as ink. Over us the rising wind was moaning, precursor of swift hurricane. If we could not get the ship into the cave, the chances were that she would first be battered against the cliffs, then lifted and thrown perhaps into the South Atlantic.

Every single man jack ashore was on the guy ropes and numbers of the crew had dropped hardily into the water to help, but the ship swung stubbornly towards the threatening angle of the entrance. They had not the weight to pull her round, and the edge of the hurricane was tearing down on us. From the cabin of the ship, I was trying to direct the operations of the men both aboard and ashore, but the noise of the wind made hearing difficult. It came to me that if we did not

act quickly, time for action would be past—so I sprang for the deflation gear and spun round the handle. In a second or two there was scarcely a foot of gas in the whole ship, and we sank into the basin. Now I shoved over the controls to half speed.

Deprived of her buoyancy, the ship was easier to handle, and as the men resisted the drive of the wind, we forged ahead into the cavern, our propellers lashing the water and our cabin awash.

It was in the nick of time, for even as her rudder passed the jambs of the entrance, the crest of the hurricane caught the ship and threw her stern against the fender ropes. But we were inside at the cost of strained rudder stays and one propeller-blade broken. The great doors were closed against the storm, which was now upon us with clamorous fury. To restore a measure of buoyancy to the ship, enough at least to take her out of the water, was only a question of turning on our reserve gas. And in a little *Ark of the Covenant—I* was snugly secured by her mooring stays in her own hangar cave.

All this time the Chief had not moved from his position. He had been clinging by his single hand to a rail, and I turned to him with an apology for sousing him and his wonderful instruments. But the only reply I received was one of his extremely rare handshakes, and I knew then that I had somehow pleased him.

We went together to the living quarters, and when we had changed I joined him in his laboratory to watch the storm. Fortunately the windows of the laboratory and of the living-rooms were sheltered from the force of the wind, and we caught nothing but the eddies. Outside, the land lay in half light, but it was possible to see that the trees and shrubs near us were bent low and laid flat by the terrific drive of the hurricane. Sometimes a great tree would give, the earth below it would part and the roots would come up majestically into the air with a cloud of broken soil. At times one of these uprooted trees would be lifted bodily and carried through the air like a feather. Bushes were flung high, and the air was filled with debris, whizzing along at lightning speed. I thought of the lines from the "Deluge" of R. L. S.:

> To hear, frae the pit-mirk on hie,
> The brangled collieshangie flee,
> The warld, ye'd thocht, 'twixt land an' sea,
> Itsel' had coupit,
> And for auld airn, the smashed debris
> By God was roupit!

Then came the rain, a grey streaking curtain of it, thickening in texture till it was almost a solid mass of water obscuring the view, its base a teeming mist of shattered drops. Thicker and more dense it grew, till the roar of it drowned the voice of the wind.

Suddenly the fall of the water—it could not be called rain—thinned, and a terrible spectacle came before our eyes. The water thinned, gathering to a dense core, and wreathed into a whirling spiral which spun up and up until it widened into an inverted cone of leaden cloud, behind which the lightning played in livid sheets and splashes. And the dense column of water moved over the cup north of our plateau, solemnly, majestically, roaring the tune of its march as it went, with undertones of the crashing thunder. Its trail was a wide path of smashed and riven trees and flattened shrub. Over the cup of land the column moved, leaving a sheet of desolate water, until it passed to the spur of hills of which the plateau was the point, and was lost to our sight. Its voice now was muted to a distant murmur, fretted by jagged mutterings of far-off thunder. The drab greenish mauve of the sky lightened to a generous amber.

Of our relief that we had found haven before such an awful visitation let a second silent handshake between the Master and me bear witness. Yet our worst danger was still to come, and we were to find that we had congratulated each other too soon.

The river of the northward cup was lost in a wide sheet of water, and it was apparent that the outlet gorge was too small for quick drainage. We saw that the water of our entrance basin was rising steadily and quickly, which meant that the level of the waterway within the cavern would be rising also. This we found to be the case, but towards nightfall the rise seemed to have found its maximum. We were cheated into a false sense of security.

The note of our cavern waterfall gave us first warning of the danger. In the years of our sojourn under the Plateau of the Scar, the voice of the fall had ever been a friendly whisper to us. We lived with its solacing murmur always in our ears, and I think we missed it when absent from the cave. But in the middle of the night after the hurricane, we became acutely conscious that its note was changing—growing louder, gaining a suggestion of menace.

Desperate Work

THE noise swelled into a threatening roar, and as I got up from my bed to dress, the whole cavern was filled with a hoot and rumble which vibrated enough to shake the teeth from one's head like pips from a squeezed orange. It was plain now why the Indians avoided the Plateau of the Scar. The noise was terrifying.

Already most of the men were astir, for the uproar made sleep impossible, and when I got out of the dormitory into the main cavern and pushed home the main switch, the arcs lit up a sight that spelled immediate danger. The column of water from the fall was coming down its passage at such force and volume that it was describing an arc above its normal ledge, shooting clean past the turbine barrier right to the center of the cavern lake.

The level of the water in the cavern was creeping up at an alarming speed, and already the machine-shop was flooded, the oil-cave awash, and most of our working floors were under water. I mustered all hands, and we tumbled into launches and barges, or indeed into anything that would float.

Our first concern was to throw open the big gates of the cave entrances, lest they should impede the egress of the water, but this gave little relief.

To save our ships from being crushed against the roofs of their caves was our next thought. We found the first ship so deeply awash that she was straining at her mooring stays. We slackened these, so that she rose until her top was almost scraping the ceiling, but the water mounted so quickly that we found this expedient useless. I would have taken her clean out of the cavern, but the height of the entrance was perhaps the lowest point of all in the great chamber, and with the high level of the risen water that way of escape was barred. All we could do—and a despairing measure it seemed—was to unmoor her and maneuver her to that point in the cave system where the ceiling was highest. I shall not dwell on the strenuousness of our labors, but it may be imagined. We were all soaked to the skin, and I was almost afraid to take tally of the men in case some of them should be missing, for every

now and then we had had to pause to rescue one or other who had wandered into deep water. I was afraid some poor chap had done so unnoticed.

We brought the first ship, as I have said, to the point where the cave was the highest, and here we moored her as best we could.

The danger for Number Two was now imminent. She was complete except for her engines, and as yet she was not buoyed with gas. When we went to look after her, we found her, as her sister had been, half immersed in water, with her stays holding her down. The stays were cleated under water and several of the men were about drowned in unhitching them. We succeeded in freeing her—only to be faced by another peril.

The roof of her cave came down in the middle to a sharp ridge, and if she rose higher the danger was that her back would be broken, or at least buckled beyond repair, for we had no rolling mills to straighten her girders. It was out of the question, again, to pull her out to a higher portion of the main cave, since the neck of her hangar was its lowest point. It was Lin Greensleeve who saved her.

Lin took a party of men with picks up to her observation top, and on her upper deck he set them to hewing down the saw-like ridge, which was nothing else than a series of stalactites of varying depths, depending from the line of some transverse crack in the ceiling. They hewed off as much as was humanly possible, and just when Lin, as a last desperate resource, was for putting in one or two of his favorite shots, the water suddenly stopped rising.

We stood by them, and examined the state of affairs. We found that Number One still had a couple of metres to spare for clearance, and that the Two, though her fabric was sadly knocked about by the fall of rock from the ceiling, was structurally intact. But the rise of the water for another half a metre would buckle her past redemption.

Lin still was eager to try a small shot or two at the stubborn points of the ridge, but as the water seemed to have found its level, and had not risen for about forty minutes, the Chief and I decided to risk the chance.

We mustered our men and found all present. They were sadly drenched and dishevelled, but cheery in spite of chattering teeth and tired limbs. The excellent Moggs had begun to cook early breakfast at the shout of "Spell-ho!" and by the time we trooped into the living-rooms he had gallons of hot coffee and mountains of appetizing food prepared. We were spared further anxiety, for the water remained at its last level for several hours, though the waterfall still roared and threw its column into the middle of the lake.

When the sun had been up several hours, the Chief and I took a launch and began to investigate the rise of the water and its ultimate holding of a maximum level. To take the sudden rise first, though it was the second point of our investigation; this was due to two things. The waterfall was supplied from that lake on the higher step above the plateau. Normally the lake was filled from underground springs, and at its usual level fed our waterfall through a submerged outlet. But with the sudden rise of the lake level, owing to the torrential rain and the cloudburst, its waters began to pour over its lip into a crack which led to a second passage running underground to join up with the normal conduit to the fall. Second, the lake waters found another outlet over the side of the hill and into a course, usually dry, which brought them into the cup of land north of the lower step of the plateau. This, with other streams pouring into the cup, brought the water speedily up to a high level, for the little cañon of our stream to the *Innominata* was not capable of letting the abnormal influx escape at any speed. Thus the waters of the cup and of our underground lake had only two means of egress: through the gorge, and through the smaller entrance to our cavern.

When the waters reached a certain height, however, they found two extra outlets. One, we discovered, was in the cave itself—a minor cave on the west side which at its extreme end shelved down to a deep subterranean chasm. The second was a break in the lip of the north cup over which the waters poured into the marshland beyond.

We now had learned our lesson, and would know what to do in the event of another storm in the future. When the waters subsided, as they did in the course of the day, we put Number One back in her hangar and brought the Two into the middle of the main cave. Lin Greensleeve had put a few of his small shots into the ridge of the ceiling, and with long leads he exploded them, to his and our entire satisfaction.

One point remains. Our fowls and ducks, who had the highest cave in the lower series, escaped with nothing worse than a bad fright. We found them huddled at the extreme end of their habitation, and Moggs declared the muster complete with the exception of one duck, probably more adventurous than his fellows, who it was surmised had been swept away by the torrent out of the smaller entrance.

CHAPTER VI
The First Raid

WE had repaired the damage caused by wind and water to the *Ark of the Covenant—I*, and that inflicted on Number Two by her sousing and the fall of rock upon her. Into Number One we had installed the last of the instruments invented by the Master for the demonstration of his discoveries. None but he and Thetford were permitted to touch certain of these instruments, for they embodied a devastating power. Two machines alone, so far, were to be handled by members of the crew—that controlling the anæsthetizing gas, and another designed to ward off airplane attacks.

The night before our first essay, the Master joined us in the common room and shared our meal. He spoke to us earnestly of the high emprise on which we were about to embark. Never have I seen our frail leader so impressive, nor ever did his tremendous personality so shine from him.

He spoke, as was his wont, in a clear, calm voice—unemotional, with no attempt at drama. He was always the reverse of dramatic, consciously, and by the very negation made himself the nub of drama the most poignant and telling. He simply asked the men to be faithful, to use the power he might have to put in their hands with care for human life, and never to let themselves stray for a single moment from the strictest sense of duty. Finally, he asked them to trust themselves and him.

"We'll trust you, Chief—all right," some of them said.

"I'm sure you will, gentlemen," said the Master. "You have shown me that I can trust you implicitly. You have done well and faithfully in the first phase of

your work. No men could have done better. See to it that you finish your course with equal faith, equal good service. If we serve our cause and each other with whole-hearted zeal, we cannot fail."

Twenty-five men were aboard *Ark of the Covenant —I* when we set out in the middle day for the city of New York. We climbed high, out of sight, practically, and, with the heaters and compressed air at work, made our way in direct line for our destination. Our journey was uneventful, and only the steady creep of the map on the navigating globe marked our progress. With the dark we dropped to fifteen hundred metres and breathed fresh air. We were over New Jersey after midnight.

We lowered our gondola with its crew to a low height, and from there we dropped our gas-bombs on a petrol station. The airship then came down until she was almost nestling on the tops of the sheds. From the airship we let down tubing, and working in gas-masks we robbed the tank of its spirit. The whole operation took less than half an hour.

Thence we proceeded to the business quarter. We dropped bombs at the ends of a long thoroughfare, and one in the centre. Again the ship was brought close to the earth, this time so that she lay along the street. The gondola rested on the car lines. To break into the food stores was an easy task, requiring no more than a stout jimmy, and our men began to hand out the stores as Devonridge and I selected them. This occupied an hour, and we came away after leaving money roughly calculated to pay for the goods.

It was now close on three. We mounted high and crossed the river until we lay over Wall Street. The gondola was lowered from a great height, and telephone communication from it gave us our direction. We strewed bombs all about the district—twelve altogether —so that the gas clouds wreathed the streets visibly to us, though invisible to anyone on the ground. We then came down, as indeed the Finn, Klenski saw, close to the roof of the National Metallurgical.

Two parties of seven men, each squad with a flame-cutter of the Chief's invention, attacked the banks. Each party also had a stout little trundle cart, rubber-tired, to collect the gold. One group tackled the National Metallurgical and the Guaranty, while the other attended to the Dyers' and the Trade. The first party had finished loading the gold from its two banks into the gondola, and had begun operations on the Sub-treasury, before the other party had completed its work on the Dyers' and the Trade. When the second haul of gold and securities had been stowed, the parties combined forces on the Treasury. We appeared to waste no time, but owing, I suppose, to inexperience, an hour and twenty minutes had passed before our last haul was aboard the ship.

Meantime, according to prearranged plans, envelopes addressed in disguised hands were ready for the securities, and the little lead boxes of radium all prepared. It was my task to drop these into the box at the Post Office.

I walked out of the gassed area by back streets, and was fortunate enough to escape observation, for when I came round by the park above the Post Office, I saw a thickish crowd further down Broadway, apparently trying to find out what was happening at the lower end. Street cars stood one behind the other in a procession, for the Chief had thrown a ray over the area to upset all electric circuits, to avoid accidents from the traffic. The vicinity of the Post Office, however, was bare of people, and I dropped my packages into the box unnoticed.

I returned by the same roundabout route, only stopping to put my gas-mask on when I knew I was approaching the danger area. The only person I saw previous to that was a policeman, who was innocently rapping and trying doors. My heart went a little faster as I passed him, but my garb was not unlike that of an officer of the American air police, and he saluted me, wishing me goodnight. He could not have known that just round the corner of the street was a stopped motor-truck, over the dashboard of which two men sprawled unconscious.

Altogether, it was a scary business, and I determined in my own mind that on the next raid there would be no going out of the affected area. It was too risky, for I could not imagine what I should have done if the police had completely surrounded the district.

I entered the gondola and was pulled up with the rest of the gang—as I might dub our League—and within two hours of our arrival above Wall Street I was steering the ship high above New York as she made out to sea.

All next day we lay poised over the Atlantic at a great height, and we slept in watches. Towards night we began to cruise about, for we had picked up papers from the banks which gave us information of the *Parnassic*. We saw the oil-tanker, *Westbury*, early, and marked her course for further use.

We saw the *Parnassic* long before we attacked her. Indeed, we followed her easily for an hour before we shot ahead to lower the red riding lamp which stopped her. We had dropped our gas in readiness in her path, and when she hove to we manœuvred it about her. We then swooped down alongside and laid the gondola close by. Our piracy occupied forty minutes.

It was pitiful to see the ship so helpless, and the sight affected the mariners among us very strangely, but there was no ice in the sea near by, or the Chief certainly would have taken measures to restore some of the ship's company to consciousness before leaving.

We now sped after the *Westbury*. The only thing remarkable about this raid was the extraordinary truculence—by wireless phone—of her Yankee skipper. He seemed to bear little love for the navy of his country, and one would have thought that a warning to heave to was the biggest insult he had ever had in his life. But that rasping voice was soon stilled by our gas and we had little difficulty in helping ourselves to the skipper's excellent aviation spirit.

These raids accomplished, we circled wide out to the Atlantic, and were snugged down in the cavern by early the next day.

Further Success

THE news we had of the effect of our raids was meagre, for we picked up very little through our wireless, but that we had created a deep impression we felt sure.

A fortnight after the New York raid we descended on Louisville, and there, besides making off with gold and foodstuffs and petrol, we robbed the newspaper files in one of the banks, a point that has escaped notice. From these journals we gained an idea of the turmoil and consternation our raids had caused.

Among other things we noticed was the fact that the business chaos we intended to bring about by taking the securities had been lessened by their speedy return to the proper quarters, and since the idea was to disturb business as much as possible, as a preliminary to

our further plans, we decided that there should be no such mistake made in future raids. It was only because this point had not yet occurred to us that we held to our first procedure in dealing with the Louisville bonds. We had not, of course, then read the newspapers.

The gold which we had collected up to this time, we melted and recast into ingots of our own design. The gold was of no value to us in view of certain powers within the hand of our leader.

Our next raids were to test the staying powers of the *Ark of the Covenant* to the full. We knew from chance messages picked up that the air police of America were active in their lookout, but of the disposition in England and Europe we knew nothing.

The long flight to London was made without mishap, and here, in the Bank of England and elsewhere, we created as much trouble for business quarters as we could. To drop bombs all about the Houses of Parliament and nestle on the terrace was the easiest thing we have ever done, for the district round about was little frequented at the moment. We did not even have to take any precautions against traffic running amuck.

This raid was a demonstration of power, pure and simple, and our leaving of the radium beside the mace was definitely done so that it should be quite realized that it was we who had put the Commons to sleep.

My helper in this exploit was Lord Devonridge, and as he had been told of the idea beforehand he was prepared. It was he who blackened the faces of the members of the Front Bench—in revenge, he said, for the heavy taxation of his class which had driven him from the country, and as a reprisal for the docking of the privileges of the Lords.

When I turned to find him thus busy with his prepared cork, my first feeling was one of surprised annoyance, but there was something so ludicrously unexpected in the business-like sangfroid with which he set about the task that continued anger was impossible. I imagine, to be candid, that the absurd spectacle afforded me in one particularly offensive politician, from whose obtuseness I had frequently suffered while in the air service, had a great deal to do with my complacence over the scheme. To see the pompous fat-head with his face blackened was complete solace for all the irritation I had experienced formerly through his fatuous ignorance.

The Chief, however, took another view. He considered that our mission had been degraded, and he gave Devonridge a wigging which, while it held no trace of anger, did not lack in point. But even the Chief was not proof against the gay, insouciant humor of Devonridge, and in the end I think he forgave the culprit fully. At any rate, the joy of the English members of the crew was worth any little lowering of tone we suffered by the exploit.

The raid on the House of Commons occupied little more time than it takes to write of it, and after operations on the Army and Navy Stores we dropped down the river to Purfleet, where we replenished our depleted store of petrol. Once again we took to the highest we could compass, and we drifted slowly west to be in readiness for our descent on Berlin.

The Berlin raid was accomplished without mishap, but it was at Paris that we were made fully aware of the preparations against us. We were comfortably settled on the top of the buildings in Rue Bailliff, and the burglary party was inside the Banque, when we heard the drone of airplanes. Fortunately, Thetford was on the ship's observation top in readiness for such an emergency, and in spite of the machine-gun fire the little fellow pluckily manipulated the ray for upsetting the electric circuits of the plane engines. He came out of the scrap without scathe, and had the satisfaction of seeing both his opponents go down out of control. We hastened the depositing of the gold, which was designed for creating further confusion in the minds of those after us, and left our usual quantity of radium, before speedily taking to the air again. From Paris at a great height we bore due south until we were over the Pyrenees, where we swung sou'westerly in arched line for the plateau.

It was now apparent to us that we had put a very effective spoke in the wheel of the world's business, and had stirred Europe and America into a state of apprehension and mystified anger. It was plain, too, that drastic measures would be taken to run us to earth, now that it was definitely known the raids were accomplished by airship. We determined to demonstrate our powers by daylight, and give those who chased us every chance to meet us if they could.

Our raids on Europe took place on a week-end in April, and our next raid, which was by daylight on shipping along the South African route from England, took place on the first Sunday in May. We knew from the wireless messages which we picked up that many airplanes were after us, and later, when we had skipped back to the plateau, messages emanating from one particular plane, the *Merlin*, showed that we were being pursued by the fastest air machine ever known.

We took the trouble of recording the messages from this *Merlin*, and we began to note that not only could she get about from place to place in incredible time, but she seemed capable of extremely prolonged flights.

The following week-end found us raiding shipping on the North Atlantic, while the *Merlin*, we knew, was scouring the Canaries. News of our North Atlantic raids—which we took the trouble to relay by wireless ourselves—brought the *Merlin* to the Azores, but by the time our most assiduous pursuer was sweeping the Atlantic for us, we were flying out of sight above him on our way home.

We now rested for another week, and in the late evening of the middle Saturday of May set out for further raids on the African shipping. We reached Madeira in the early hours of Sunday morning, and found a temporary mooring place on the Paul da Serra, that barren piece of desolation to the west of the island. There we lay snug until the first peep of day, when we unhitched to fly northwards to intercept a Union-Castle liner. This time we were unaware that the ubiquitous *Merlin* was close behind us.

A Little Spying

WE had dropped our gas cloud and had swept the ship with it. We had grappled our gondola to her side. It was a raid of terror, merely, but we broke into the strong-room as a matter of course. We found little, not enough to justify abstraction, but we were helping ourselves to the ship's stores of food when the message came from aloft, "'Ware planes!"

To recall the crew was a matter of seconds, and we had the gondola into the ship and had cast off before the silver plane dived at us. Eastwards, now, we saw the approach of the British plane-carrying cruiser.

There was something divinely beautiful in the swift, brave swoop of that lovely silver shape. She came down at dizzying speed, so that it was useless to try our ray upon her, for she had the force of gravity to bring her. But we opened the gas-jets about the ship,

making a cloud of anæsthetic envelop us. It seemed with the steady rise of the ship that the plane was bound to miss us, but we were sadly mistaken. The pilot knew his business. Before we realized what had happened, he had flattened in a fashion which would have shattered the average plane into her component parts, and we were openly fired upon with accurate bursts of shell-fire both fore and aft of the plane as she whuzzed under us.

The *Ark of the Covenant* staggered a little, but answered readily when we gave her more gas. She rose steadily, and now our foes had to climb. We saw that the *Merlin*—for so we supposed our attacker to be from her speed and her fine design—was somehow immune from our gas cloud. She swung after us into the cloud, but got off a burst of shell-fire none the less. She found she could not take us at her present angle and she spun quickly about. Her pilot was one in a hundred for knack. Machine-gun fire from her quarter, and another burst of shells from astern. We could not afford to experiment any further, and we put our ray on her. She slid back on her tail immediately, only to flip over into a well-controlled and peculiar hovering descent. To make sure of her, we swept a gas cloud about her as she lay on the sea.

By this time we had to turn our attention to the cruiser, which was coming up on our position in great style. We saw a plane catapulted after us, and presently the cruiser opened fire with her heavy anti-aircraft guns. Then came a second plane. The remainder of the encounter was as has been previously described, down to the messages which passed between us and the *Brilliant*.

We could have cleared beyond range at any time after dealing with the *Merlin*, and our only reason for prolonging the business was to see that the pilots were picked up. We did not want any of them to be drowned after an extremely plucky fight. It was for this reason that we swept the gas from about the Merlin and told her her engines were all right. When we saw that all was well, we gave the airship her full lift of gas and made eastwards out of sight, where we turned south for a space before swinging westwards and home to examine our hurts.

The damage done to us by the *Merlin's* guns was not important, and we considered it valued at the measure we had taken of the plane's capacity against us. She had raked the dining quarters of the crew, wrecking them almost, and had pierced several of our ballonets, but had missed everything vital. There were no casualties to speak of, save that Billy Haynes took a machine-gun bullet in the leg, a mere graze which did not even make him limp. But, unimportant though the damage to *Ark of the Covenant—I* was, it was enough to put her out of action for a space and necessitate the commissioning of her sister ship. The *Ark—II* was fully equipped and had been tried. She was in a state of complete preparation to take to the air.

The swiftness of our flight, which was far beyond the speed of any known dirigible, and the fact that we had two ships, did much to create the impression among our pursuers that we had a number of bases. We hastened to complete that impression sixty hours after our encounter with the *Merlin* by a descent on the other side of the Atlantic. Here we raided several ships in the Caribbean early on the following Wednesday morning. We knew from messages that our most avid hunter still was looking for us off the coast of Africa

Early next morning Travers Lippencott in an automobile picked me up in the country outside New Orleans. He had been informed of our needs by a mysterious and incomprehensible wireless message from us, kindly exhibited as a great find by all the newspapers. I was conveyed into New Orleans, and after a long consultation with Lippencott on the situation, I went to New York first, then to Washington.

Our purpose in this action was not so much to spy out what preparations were being made for our reception in the event of further land raids, though I learned a good deal about this incidentally, as to discover how ripe the time was for further developments of our ideas. It was easy to see that people were in a state of nervous tension, no town knowing when the mysterious enemy would come down upon it.

Our robberies in Europe and America had induced panic in banking circles, and a wave of deepest depression was sweeping over business. For myself, I was almost appalled by the chaos that reigned in the markets, for I well knew the regular prices of the best American securities, and these were selling at ridiculous figures. So far, it was plain, our plans had succeeded beyond our wildest hopes, and the time was ripening for the enlargement of our campaign. The rumors of war which had been rife in the early part of the year had faded away—the nations were too busy suspecting each other of being behind the raids.

The position of a spy is never agreeable, and I cannot say that I enjoyed meeting old friends, who insisted that as a known airman I should take a hand in the pursuit of the raiders. It was not pleasant, again, to hear men bewailing the condition of affairs in businesses they had built up by the honest work of years. I felt as if I had stabbed them in the back, and each new grip of the hand from friends who were suffering only deepened a conviction in me of villainy. It would hardly become me to examine my feelings further, since I carried on with my task.

Fortunately for my investigations, I was well known in America, and to reach the President himself was a matter of no great difficulty. The presence in Washington of Lord Almeric Pluscarden made things easier, because I had often stayed with him and his niece, Kirsteen Torrance, at their country house in Kent. My relationship to Lord Almeric had been one mainly of business, but he was good enough to desire my friendship as well, and he and Miss Torrance and I had become close friends in the few years I had known them.

It was something of a shock, then, to find Miss Torrance—and Lord Almeric in a degree slightly less emphatic—so deeply set on the discovery and defeat of the League of which I was rather an important member. I found myself in a position of secret personal antagonism to friends for whom I cared a good deal It was ever on the tip of my tongue to start defending my motives for acts which they condemned without knowing me for the perpetrator. I should have escaped earlier from Washington, except that I had a lively curiosity to see this Jimmy Boon, of whom both Kirsteen and her uncles talked with such warmth and, I think I saw, affection.

The name was familiar to me as one of a man who had done some remarkable things in the development of aviation, and indeed I saw his name every time I examined the exhausts of our airship engines, for it was his double silencer which permitted the stealthy approach for which we were so notorious.

That James Boon piloted the *Merlin* which had put

up such a good fight against our airship was an additional factor in keeping me fixed to my uncomfortable position in Washington. I was hoping that the *Merlin* would return when it was found that haunting the coast off Mogador was without profit. But for that, I should have gone to New Orleans and waited there for the time when the *Ark of the Covenant* was to pick me up again on a date already fixed.

The *Merlin* arrived on the last day of May, and I met our principal antagonists at the White House, as has been told. Then I learned much which interested me, and would interest the Chief. There was no doubt that Boon and his scientific friend, Lamont—though I must not forget the redoubtable Milliken—were a remarkable combination. It was not at all unlikely that in the long run we should meet again, and it was quite probable that their tenacity would bring them into close range of the hiding-place of the League.

A Wish Come True

I LEFT Washington on Friday following my first meeting with Boon and his friends, and my hint that they should ask the raiders why they raided was dropped by intention. The *Ark of the Covenant* picked me up on the Saturday night, and on the Sunday night we were out over the sea due east of Washington, waiting for some vessel through which we could answer the wireless message to the President.

That we fixed on the *Pershing* was the merest accident. She was the handiest for our purpose—that was all.

We found the boarding of the battleship decidedly difficult for the reason that she still steamed after we had brought the gas about her; the members of her crew on the upper works became unconscious, but the gas apparently did not percolate into the engine-room. We had to keep pace with her and carefully let the gondola light on her after-deck. Taking small bombs of the gas with us, we went forward and got down to the engine-room, where we slung our missiles. Then one of our engineers brought the ship to, and some of the seamen released her anchor tackle. We left the message in the wireless cabin, and immediately set off for Washington.

We were over the capital when the message was relayed there, and we picked it up while we were hovering high above the city. That was the moment we were waiting for. A little time was allowed for the delivery of the message to the President before we swooped down on the White House, bombing as we came. A few minutes later, the gas having been carefully drawn away from the Mansion, the Master and I walked into the room where the President lay unconscious, with Boon, Lamont, and Miss Torrance with him.

The little Chief looked very stern and grave as he gazed on the scene, and it was he who put the cushion under the President's head and covered him. He left the note in answer on the table.

"Find something to cover the girl, Seton," he said. "She is thinly clad."

"Boon's flying coat will do for Miss Torrance, sir," I said, and with a very queer feeling, although I knew she was unharmed, I put the coat about her. I turned to find the Master looking at me strangely.

"Who did you say the girl was?" he asked.

"Miss Torrance, sir. The President's niece."

"Then she must be related to that David Torrance who was something of a physicist twenty-odd years ago?"

"His daughter, sir."

"I knew David Torrance well—and his wife," the Chief said slowly. "I did not know they had a daughter—"

He walked over to the sleeping girl, and said, with a little pitying gesture of his one hand:

"Poor child! She can never have known her father—"

He turned his mild gaze on me, and it held nothing of the slight emotion or pity that had seemed to lie in his voice.

"Come, Seton," he said quietly. "'This night you and I have lit such a candle—!' Pray that Benjamin Whitcomb has courage worthy his great responsibility!"

We went out by the window, closing it behind us.

For the next week we did not move from the plateau, except twice by night to pick up wireless messages. The effect of our answer to the President was difficult to gauge from what we picked up, but certainly our method of making the reply was bandied about in wonderment from coast to coast. That there was no likelihood of an armistice being declared we knew from the speedy pursuit of us by Boon and company, who were patrolling within—for the *Merlin*—two hours' flight from our lair. Whether they had come upon such a hot scent of us by accident or not we did not know, for certainly we had done everything that varying speed of flight, and varying direction, could compass to confuse pursuit. The point that interested the Chief about the crew of the *Merlin* was the presence of Lamont, who, he declared on the evidence of several of Lamont's papers on physics, had one of the keenest brains in America.

"I should like to meet Mr. Lamont," the Master said to me in his gentle way. "I almost wish we had kidnapped him at Washington, my dear Seton. And if Mr. Boon shows signs of coming any closer to our hiding-place, I may begin to regret we did not capture him also. Lamont, in one of his papers, made a surprising mistake for him in an otherwise interesting speculation on the variation of electrons. I think I might make his error clear to him."

"We may have Boon and him down on us at any minute, sir," I laughed. "We might kidnap them then."

Within a fortnight my jesting suggestion came to earnest reality.

A severe storm broke over us on the following week, and it lasted off and on for six days, with extraordinary electrical disturbances in the atmosphere. We slacked then, until on the Saturday night in the third week of June we began a series of raids on shipping on both sides of Panama. On the Sunday morning we knew that Boon was hot after us—he was always terribly frank with his wireless messages—but we went out again on the Sunday evening and stopped a ship between the Galapagos and the mainland.

We were returning over Guayaquil and flying quite low, when we saw the *Merlin* lying in the roadstead of the harbor, a tiny little shape of dull silver against the blue of the water. I am certain that we saw her before her crew saw us, and as soon as I caught sight of her I altered our course to a good number of points southerly, but I did not alter speed until the harbor had disappeared behind the mountains. When that happened, I altered the course to its real direction, and put more power into the engines of the ship than she had ever had before. She leapt to it as no air-machine ever sped save the *Merlin* herself. We did not make for height, the time for that was not yet. We simply sped as though the devil himself was at our tail.

A sharp lookout was kept astern from every possible point of sight, but it soon became evident that the *Merlin* either could not take the air or had failed to see us. I thought the latter reason for her non-pursuit most unlikely, and had two ideas in my head. If the *Merlin* came into view before we could get to our cavern, I intended to overshoot the mark, climb high, and send her down by means of the rays. Clever as the plane was, she could not get above us, and under us she was completely at our mercy, without the slightest chance of retaliation. But I did not want to send her down in a place where her crew would be unable to escape.

By sheer good luck we were able to be snug in the cavern with the great doors shut before we saw the *Merlin* come winging up in a wide circle from the south-east, a fact that made us realize again her magnificent turn of speed, since she had been able to follow the false trail and make loops in search.

I had taken a party of men armed with Winchesters to the top of the plateau to watch, for with the basin and the amount of water around us, there was distinct temptation for a seaplane to alight.

Like some graceful great bird the plane swooped down on the plateau, and, hidden among the trees, we saw her zoom over the edge of the bluff east of the red scar.

I stationed my men among the shrubs west of the scar, in case Boon would take it into his head to come down on the upper lake and begin to investigate. And so it fell out. We waited a considerable time, then we saw Lamont and Boon descend the bluff.

We were ready for any eventuality.

They came out of the bush and approached the red scar, which seemed to interest them greatly, especially Lamont. They then worked round it to the north, and disappeared among the shrubs and trees in the direction of the cliffs over the basin. I sent several men to cut off their retreat to the *Merlin*. But the visitors did not immediately go back to their plane. They bore down the west side of the outcrop towards the sinter cones, and it was behind these that I had my men disposed, close to the descending passage to the caves.

When they had fully assured themselves that their suspicions were well-founded, we held them up. They were blindfolded and led down the underground passage, while I took my men up to the lake to see what could be done for the remaining visitor.

(*To be concluded*)

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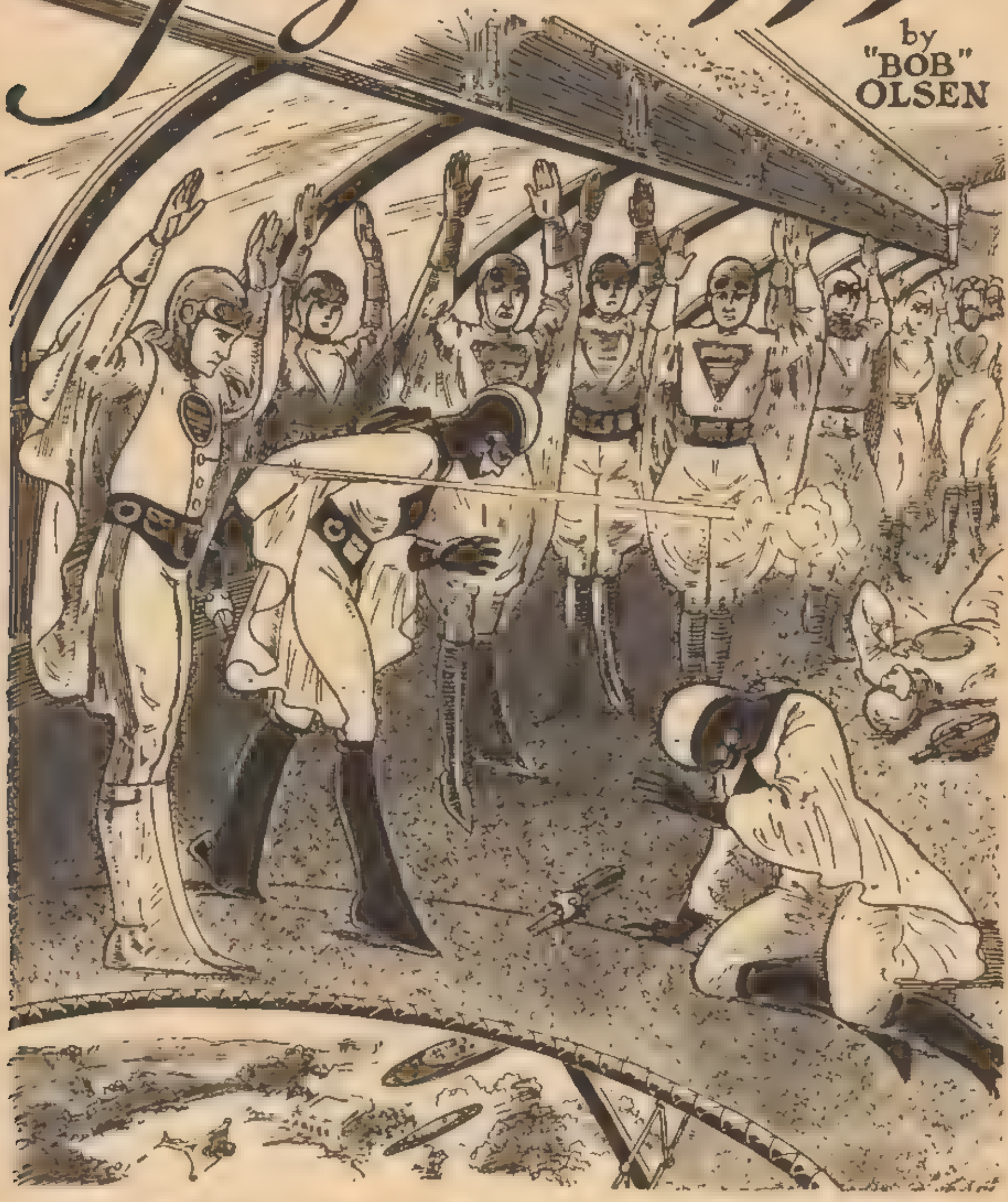
Flight in 1999

by "BOB" OLSEN



Yek brought his toes together, completing the electric circuit, and a tiny vortex ring of gas shot out. In a moment the arrogant female bully crumpled to the floor like a deflated toy balloon.

"WHAT did you think of the crime that was committed by the Purple Women last night?"

Yek put this question to his wife Kaza as, together with their nine-year-old son Ralus, they sat eating breakfast in their mountain home just north of Burbank, California.

"They certainly are getting more daring and more ruthless every day," Kaza replied. "According to the account I received through the hypnoscope while I slept last night they vibrated over a score of men and women with no apparent reason. The newsitor compared them to weasels that slay not out of necessity but merely for the joy of killing. It certainly is frightful the way crime is getting the upper hand now-a-days."

"I suppose that's the penalty we have to pay for recent developments in science and invention," Yek rejoined.

"But one would expect that as mankind develops in knowledge, crime would be wiped out—or at least diminished materially, instead of increasing at such a terrible rate as it has during the last few years."

"It's reasonable enough to expect an improvement in moral development to accompany scientific advancement, but history shows the opposite to be true. My father told me that in the early days when his grandfather was judge, fully fifty per cent of the crimes that came to his attention could be traced to automobiles, which at that time were being widely used by criminals."

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At this Ralus, ever on the alert for words he did not understand, piped up with, "Daddy, what's an automobile?"

"Surely you must know what an automobile was," his father came back at him. "Haven't you studied about automobiles in your history yet?"

"Not yet. You mustn't forget, daddy, that I've been going to school for only three years and I just started in high school a month ago."

"Well then I suppose I'll have to tell you. The term automobile was applied to a very primitive kind of conveyance which was used seventy years ago. It was a cumbersome device with four wheels and an excessively heavy motor. It burned a liquid called gasoline and crawled along the ground at the snail-like pace of from twenty to fifty miles an hour. There were a few specially made automobiles that succeeded in attaining a speed of about two hundred miles an hour but they were too costly and too unsafe to be practical."

"But, daddy, I thought you told me once that when you were a boy you used to travel in airplanes."

"That's correct. The automobile passed out long before my time. And I believe I also told you that the airplane was an extremely crude contraption. It was so limited in its scope that it was practically worthless without the automobile to supplement it. All my knowledge of the automobile is from my father.

"You see the airplane was considerably heavier than air and it had no *gravinul* to diminish or eliminate the attraction of gravitation. It couldn't rise abruptly from the ground, as our spacemobiles do. The only way it could get into the air was by making a long run along the surface. It also needed lots of room in landing, since it could not be brought to a stop instantly.

"All these things made it necessary for the airplane to depend on enormous, specially constructed fields called airports. Some of them were more than a mile long. Naturally it was impossible to provide such huge open fields in the congested sections of a metropolis and the airports were usually situated at some distance away from the cities they served.

"Both passengers and freight had to be carried along the surface for anywhere from five to fifteen miles, and this was usually done either by automobiles or by so-called motor trucks, which worked on the same general principle. Sometimes—as for instance in traveling from the center of San Francisco to the center of Los Angeles—a passenger would have to waste more time getting to and from the airports than he would spend in the air."

Ralus Learns Something

"THAT must have been a blink system," the boy remarked.

"Ralus, dear," his mother interposed. "How many times have I told you not to say 'blink'—or any other slang expression for that matter!"

"Excuse me, mother. I meant to say that it must have been egregiously inefficient and excerebrose."

"That's better. I'm glad to observe that you are at last beginning to acquire something more than a schoolboy's vocabulary."

"And now to resume our discussion," Ralus continued. "You said, daddy, that the airplane didn't have any *gravinul*. I thought the *gravinul* was invented way back in 1930."

"You are probably thinking about the discovery of the scientific principle on which the *gravinul* was based. I think it was in 1929 that a man named Einstein gave the first scientific explanation of the relation between gravitation and magnetism. The *gravinul* was invented about twenty years later by a man named Jones — Charles Jones."

"But, daddy, that couldn't be. Charles was the name of the man who first flew from New York to Paris."

HERE is a story by the well-known science-fiction author that we can warmly recommend to your attention.

The author certainly opens up an entirely new vista before our eyes, yet he is careful never to exaggerate scientific and particularly aviation possibilities. While a few of the instrumentalities which he describes may never become applied commercially, yet there is nothing wrong with them scientifically. We are certain that all of the things of which the author speaks so convincingly, could some time in the future be used just as he pictures them to us.

We are certain that the story will arouse your enthusiasm.

"You mean Lindbergh. Yes his name was Charles too. In those days there were hundreds of people in the world having the same names."

"That must have been awfully confusing."

"It was. When my father was a boy there were over two hundred men named John Smith listed in the Los Angeles City Directory. And I guess there were pretty nearly as many named William Jones."

"How could anyone tell them apart?"

At this point in the conversation Kaza interrupted: "Ralus, dear. Don't you realize you are monopolizing your father's attention? I also have a few matters I should like to discuss with him."

"Oh excuse me, mother. I didn't mean to be discourteous. But there are so many things to learn nowa-days."

This prompted Yek to reprove his wife mildly. "Don't you think my dear, that we ought to encourage Ralus to ask questions, instead of discouraging him? It was over a hundred years ago that a great philosopher said 'the unquestioning mind is an unthinking mind' and surely we don't want Ralus to stop thinking, do we?"

"Certainly not, my dear. I haven't the slightest objection to your answering his questions, except that it is almost time for me to leave and I have something to tell you."

"What is it, honey? Nothing serious I hope?"

"No, nothing serious. It's just that I had grief with my spacemobile yesterday afternoon. The external lubricator went caducous and I had to leave it at Reno. The blink mechanic there told me he couldn't have it ready until noon today."

Ralus began to giggle.

"What are you laughing at?" his mother demanded.

"Because you'd hardly got through scorching me for using slang, when you said caducous and blink in the same paragraph."

At this Yek laughed heartily. "There are some cases where the use of slang is justified. At any rate it's better than profanity, eh my dear?"

"The worst of it is," Kaza resumed, "I have to make a trip over Zion Canyon to get material for a booklet I am to prepare right away. The tourist season hasn't opened yet and the spacebus service there is terrible."

"I know what that means," Yek responded. "You want to borrow my spacemobile. No argument about it. Help yourself."

"Are you sure you can spare it today?"

"Easily. I expect to be working all day in my San Francisco laboratory. I'll have time to catch the eight-fourteen spacebus, and that will get me into Frisco before nine."

"Thank you so much, dear. That certainly is sweet of you."

"You are quite welcome."

"I'm afraid you've let your coffee get cold. Just a moment and I'll have Televox bring you a fresh cup." She whistled a short musical strain and in a few seconds the door from the kitchen opened and the grotesque metal body of the Televox entered and set a steaming cup of coffee on the table. Kaza whistled another little ditty and the mechanical servant glided back into the kitchen again.

Ralus took advantage of this intermission to pick up his broken thread of questioning. "Mother, dear, do you mind if I ask daddy another question?"

"Ask as many as you please, my son. I've had my little say."

"This name business is what's puzzling me, daddy. It doesn't seem reasonable for even two different persons to have the same name—not to mention two hundred persons. Didn't they register names in those days?"

"Not until the year 1952. Our present system of naming was first suggested by a woman named Dex, a member of the same profession your mother now follows."

"You mean she was an advertising counsellor?"

"Yes. And the interesting thing about it all is that she merely applied to human beings the simple, common sense rules which had for years been used in naming pins, peanuts, pants, prunes and other branded articles.

"The law now requires that a name shall be given to every child and this name must fulfill all these requirements: It must be an arbitrary combination of letters that has no meaning and that is different from the name of any person now living; It must be easy to spell, pronounce and remember. If the child is a girl her name must begin with one of the first thirteen letters in the alphabet. A boy's name must begin with a letter between "M" and "Z."

"Parents are allowed ten days from the date of birth to select a name to their liking. Naturally they have access to the register at Washington in checking for duplication. In case the parents neglect to do this, a name is arbitrarily assigned by the Naming Bureau.

"There are a lot of other interesting details about the system, as for instance the method of knowing whether a person is married or single and also the occupation, but it's getting late, so I'll have to tell you the rest some other time."

Domestic Difficulties

THEN Yek turned to his wife. "You haven't forgotten about that trust deed that falls due tomorrow noon, have you dear? You remember, don't you, that you told me not to worry about it and that you would take care of it?"

"Good zenith! So I did! At the time I told you that I felt sure the Volun Company would pay me that twenty-eight hundred they owe me, but they have been staving me off and it looks now as if I'll have to sue them to make them pay."

"But don't you realize that we must have the money in Screb's hand not later than to-morrow noon? You know how he is. When he gave us notice that he wouldn't renew the trust deed I had the feeling that he was trying to get our home away from us."

"I know it, but I couldn't help it, could I?"

"At least you could have told me before, so I could try to get someone else to take over the trust deed. That's just like a woman, to leave everything to the last minute."

"And it's just like a man to blame his wife for something that couldn't be helped."

It was then that Ralus broke into the conversation. "Now please, mother and daddy, don't get to quarreling again. First thing you know, you'll be getting a divorce and then where will I be? Cheesity, but I wish we could get over these everlasting financial difficulties. Seems as if the only time you two start talking mean to each other is when you get to arguing over money matters. You just wait until I'm old enough to work. You can bet I'll do my share so you won't have to fight over money any more."

"I guess the boy is right, Kaza," Yek said, as he

reached over and patted his son's hand. "We have enough to worry about without trying to make things unpleasant for each other. I'm sorry I spoke harshly. When I get to Frisco I'll go in and have a talk with Wupiz, the capitalist. I think I can persuade him to loan me the money so I can get the trust deed out of Screb's hands."

"I hope so, dear. I'm awfully sorry I disappointed you. It was very thoughtless of me not to tell you about my failure to collect that money as I had expected to."

"Oh, that's all right, honey. We all overlook things once in a while. And I'll take care of it some way. I'll phone for an appointment with Wupiz while I'm riding on the spacebus."

"You must be on the lookout for the purple women, Yek, dear," his wife admonished him. "It wasn't so long ago that they robbed the Pacific Space Express. Don't forget that they are depraved and think nothing of taking life. If you happen to get into a robbery, be sure to do just what they tell you to, won't you?"

"If they try robbing the bus while I'm on it, they are going to get the surprise of their lives," Yek assured her.

"What do you mean?"

"I worked out a little contrivance yesterday, and I'm just waiting for a chance to try it out. With it I can shoot out vortex rings of hypnogen. As you know this gas is perfectly harmless but the tiniest whiff of it will put a person to sleep for several hours. The orifice for discharging the gas is in one of the buttons on my coat. I can aim it simply by moving my head. When I want to discharge it, all I have to do is bring my toes together. This joins two exposed wires in the tips of my boots, making an electrical contact which causes a ring of gas to shoot out in exactly the same direction I happen to be looking at that time."

"Well I hope it works all right. But whatever you do—for heaven's sake be careful, won't you dear?"

"Don't worry, honey. When do you expect to leave?"

"I'll have to get going right away."

"Then I'll see you off."

Kaza whistled for Televox to remove the breakfast dishes. Then the three of them prepared to don their flying coats. These garments were made of a tough, waterproof fabric that resembled leather but was much lighter and more flexible. Between each sleeve and the sides of the coat was a triangular membrane which reminded one of the wings of a bat. When the arms of the wearer were extended horizontally these membranes were stretched tight and formed a pair of serviceable wings.

The coat bulged slightly between the shoulders to allow room for the gravinul, a small box about four inches square and three-quarters of an inch thick. This was controlled by small cylinders held in either hand and connected to the gravinul with wires running along the sleeves.

Ralus was just about to put on his flying coat when his mother called to him, "Ralus, come here. Let me look at your ears. Just as I thought. You march right in and give those ears a good scrubbing, young man. The idea of eating your breakfast with a dirty face."

"My face isn't dirty, mother. I washed it good in front."

"You mean you washed it *well* in front. But you know very well that you have to wash it on the sides too—and don't forget the back of your neck."

"All right, mother," and Ralus disappeared into the bathroom.

Into the Air!

BY this time, Kaza and Yek were drawing on their flying boots, which fitted snugly about their calves and reached almost to their knees. These boots had unusually long and pointed toes and the space between the top of the foot and the front of the shin was filled with another triangular piece of membrane, very similar in character to the wings on the coats. It was quite apparent that the purpose of these boots was to provide a sort of tail and stabilizer. Both Kaza and Yek wore breeches not unlike those used by American soldiers during the last war. A head-gear with goggles attached completed the outfit.

When they were thus attired it was hard to tell which was the man and which the woman. According to the standards of an earlier day they might have been considered ill-formed. Their arms especially seemed overdeveloped and were so long that their hands reached below their knees. When they walked, their toes pointed straight outward at right angles to the direction in which they were going.

To one who was familiar with the mode of life which this couple were living, they were both beautiful specimens of humanity.

They certainly carried themselves with an air of confidence and of alertness that was both physical and mental.

When they were ready to leave, they walked to the only exit to this doorless, stairless house, which was a trapdoor leading to the roof. Yek touched a button and the trap door swung open. Then Kaza gave a little spring and floated swiftly and gracefully through the opening, followed closely by her husband.

"Seems to be a lot of traffic this morning," Yek remarked as he directed his gaze skyward.

"I imagine many of those people are going to Santa Monica to see the finish of the trans-Pacific winging derby that started from Shanghai the day before yesterday," his wife suggested.

The air was indeed crowded with spacemobiles and individual wingers. While a large percentage of them were headed westward there were thousands of others darting at terrific speeds in other directions. An observer who was not familiar with the regulations governing their seemingly aimless flight might have wondered how they could possibly avoid colliding with each other in midair.

It will be recalled, however, that a carefully planned system of air traffic regulation had been evolved as a result of many serious accidents which had occurred at an earlier time when flying was so limited in scope that no special laws regulating flight had been deemed necessary.

There were eight zone levels for air traffic, each 300 feet deep and separated by turning zones 200 feet deep. The Northbound zone extended from 1100 to 1400 feet. Then came the north to northeast turning zone, between the 1400 and 1600 foot levels. The northeast-bound section included the space between 1600 feet high and 1900 feet, with the northeast-to-east turning zone running from 1900 feet to 2100 feet altitudes, and so on.

All turns had to be made to the right, or in clockwise rotation. Overtaking was invariably done on the left side and the law required at least fifty feet of clearance between passing flyers.

When these rules were carefully obeyed there was

practically no possibility of collisions occurring, but every once in a while some reckless or irresponsible pilot would disregard an important rule and would cause a serious accident.

Besides the spacemobiles there were the spacebuses, which varied greatly in size and carried from 40 to 300 passengers each. They invariably followed definite air-lanes which were marked by air buoys anchored to the ground with luminous steel cables, at intervals one mile apart. Each of these buoys was provided with a landing platform for taking on passengers.

One of the mooring cables could be seen about 300 yards from the place where Kaza was now preparing to take to the air in Yek's spacemobile.

"Better stop at a Zip Service Landing and get a refill of pressed air," Yek told Kaza as she stepped into the machine, which was parked in the double hangar on the roof of their home. The spacemobile was about fifteen feet long and five feet high. In its general conformation it resembled the hull of an old fashioned submarine boat. There were no wheels, propellers, rudders, elevators or large protuberances of any kind.

In looking at it, an aeronautical engineer would instantly have noticed that the shape of the device was marvelously well designed to offer the least possible resistance to the air through which it traveled. The driver's compartment was just behind the nose of the flyer, the remainder of the room being devoted to seats for four additional passengers, space for storage and for the operating equipment.

Clear vision in all directions was secured by constructing the entire front end of the spacemobile of some transparent but extremely strong and flexible material, and by an ingenious combination of prisms and mirrors that enabled the driver to see everything behind, above and below without turning the head.

The Gravinul Explained

KAZA entered the machine through a small door which followed exactly the conformation of the body and could be closed hermetically. She did something to the controls and instantly the spacemobile rose gently from the floor of the hangar and drifted gracefully out into the open. Kaza blew a kiss to her husband. There was a hiss of escaping air and the spacemobile shot upward. Within a few seconds it had become a mere speck in the distance.

Yek was just about to poise himself for a flight when he heard Ralus calling him, "Just a minute, daddy. Please wait for me. I'd like to wing up to the landing stage with you if you'll let me."

"All right, sonny boy. Since I'm heading north, we'll only go to the first landing and we won't have to cross any traffic zones, so I guess you can come along this time."

Whereupon Ralus, who was now garbed in his flying outfit, suddenly stretched his arms out at right angles to his sides, gave a little leap and darted swiftly up into the air. "Let's see you catch me, daddy," he shouted over his shoulder. Then he began the most astonishing series of maneuvers in the air. He rolled and somersaulted and looped and soared. No bird that flew was ever as graceful and as agile as Ralus was. He seemed more at home in the air than on the ground.

His father soon caught up with him and playfully grasped him by the nape of the neck. "Come on!" he cried. "There's no time for monkey business. The bus is almost due now"

Within a few seconds they had reached the 1100 foot landing and had seated themselves on the bench provided there.

"Tell me, sonny boy," said Yek, "why did you ask to come with me this morning? Was it because you enjoy your daddy's company?"

"In a way, yes. I always enjoy being with you, of course, daddy dear. But to be perfectly honest with you, the main reason why I came with you is that I want to ask you some more questions."

"So that's what's in the air, is it? I thought as much. Well you'd better fire away, because there isn't going to be much time for elucidations—unless the Pacific Space Express is late and you know that doesn't happen very often."

"The first question I want to ask is about the spacemobile. You remember yesterday you promised to explain to me how it works."

"That's very simple, my boy. The thing that keeps it up in the air is the gravinul. It's practically the same as the one in your flying coat, except that its much larger and more powerful. You know how the gravinul works, don't you?"

"I don't believe I do, except that it nullifies gravity."

"That's not exactly correct. It doesn't nullify gravity, although the name might naturally give you that impression. All it does is to surround itself with a field of energy through which the attractive force of gravitation has difficulty in penetrating. The strength of this field can be varied by increasing the power in the gravinul. When you are winging, you regulate this by the amount of pressure you apply to your grips. In the spacemobile it is controlled by a small lever operated with the left foot."

"And what makes the spacemobile move ahead so fast?"

"That, too, is simple. It depends on the same principle as the sky rockets you shot off last Fourth of July. When you study physics you will learn of this principle as the law of reaction, which says that for every action there is an opposite and equal reaction. This accounts for the recoil of a firearm, the bouncing of a rubber ball and a number of other familiar phenomena.

"The driving force is nothing but air. But it is air in a very compressed form. Even before my time scientists knew how to make liquid air, but it is only within the last five years that a method was discovered for compressing this liquid into a very small space. Another improvement was made in the method of manufacture. Liquid air was formerly made by a process so expensive that it could not be used for practical purposes. But pressed liquid air is now prepared in huge plants operated entirely by sunlight, and is very cheap. Ten liters of it cost only thirty-five cents and will drive a spacemobile at the rate of a thousand miles an hour or more for about four hours."

"But, daddy, how was it that they weren't able to travel more than three hundred miles an hour with airplanes that were worked by propellers?"

"One reason was that these airplanes offered a tremendous amount of resistance to the air as they traveled through it. An interesting thing to remember about this resistance is that it increases with the square of the velocity. This means that when you travel 200 miles per hour the resistance is four times as great as when you are going 100 miles an hour. If you increase your speed to 300 miles an hour the resistance is nine times as much as it is at 100 miles per hour, and so on.

Unless something is done to cut down this resistance it doesn't take long before you reach a point where it requires a terrific amount of power to increase the speed just a little bit.

"The airplane designers made a little headway in improving the shape of the fuselage, wings, struts and other parts exposed to the air. They found that an object with a cross section like an elongated ellipse of certain proportions would offer the minimum amount of resistance, because it prevented the formation of air eddies and vacuum pockets. They also took pains to keep all surfaces as smooth as possible. It seems rather funny, though, that no one at that time thought of the simple expedient of *lubricating the outside of the airplane,* although they seemed to understand a lot about lubricating the internal working parts of the machine.

"The spacemobile makes use of an ingenious device for lubricating the entire outside surface of the conveyance. This reduces the friction of the air against the sides to such an extent that—Hello! Here comes the spacebus! I'll have to start my magnetizer going. Better fly along, Ralus, boy. And watch your winging. There are a lot of spacemobiles ascending this morning, so keep that little head of yours turning around like a wise old owl's. So long, honey boy."

"Goodbye, daddy. See you tonight!" and Ralus took off in a gracefully executed swan drive toward the ground.

A Game of Mathic

YEK rose and poised himself with arms outstretched, as the huge flyer shot toward him. It slowed down gradually and then Yek winged up to a landing platform in the bottom.

Yek found he had barely enough money to pay his fare. There was plenty of room in the huge flyer and all sorts of conveniences were provided for the comfort and entertainment of the passengers. At each seat were a pair of earphones and a device resembling a small opera glass. Yek strapped on both the earphones and the binoculars, and with their help he heard the latest news and at the same time saw several important events while they were actually happening.

He was thus engaged when Sedix, a resident of San Diego, passed near and recognized him. "Come on, Yek, old man," Sedix greeted him. "We're looking for a fourth to make up a game of Mathic. Never mind the news. There's nothing of consequence happening now. Come on and join us."

Yek needed no urging. He accompanied his friend to the game room near the forward end of the bus.

Yek needed no introduction to the other two persons. Their names, prominently displayed on the breasts of their flying coats, were Dineli Pon Archi and Tonida Pon Dineli Stu. This told Yek their sex, marital relations and occupation as well as their individual names. The larger of the two he knew must be a woman, since her name "Dineli" began with a letter in the first half of the alphabet. The "Pon" informed him that she was married and that her husband's name was Pon. "Archi" was an abbrevation of "Architect"—her occupation.

Tonida was of course a man's name and the masculine name "Pon" following it signified that he was unmarried and that his father's name was "Pon." This was followed by the name of his mother, "Dineli." His occupation, as indicated by "Stu," was student.

In accordance with this system, the name on Yek's coat was "Yek Kaza Chem," his wife was labeled "Kaza Yek Adv," and his son "Ralus Yek Kaza Stu." An unmarried woman would be designated by her individual name followed by her mother's name and then by her father's.

In addressing any individual the first name only was used, the others being merely informative in purpose. Honorary titles such as "Mister," "Miss," "Professor," "Colonel," and "Doctor" had long since been abolished.

As was the custom when two men met for the first time, Yek said, "Greetings, Tonida!" and was answered, "Greetings, Yek!" He also bowed to Dineli, but did not speak to her until she had exercised her woman's prerogative and had signified her willingness to meet him by saying, "Greetings, Yek!" Whereupon he responded with another bow and, "Greetings, Dineli!"

They sat down at a table shaped like a four-leafed clover, and Sedix started shuffling a peculiar deck of cards. To a watcher who was not familiar with it, the game of Mathic would have seemed excessively complicated. It could be played only by those who were well versed in higher mathematics. It was essentially a contest of brains and the winner had to demonstrate his superior alertness of mind and his accuracy in working out complex problems in differential calculus mentally and with amazing rapidity.

Not far from them were two very old men gazing fixedly at a dilapidated chess board.

"Can you imagine those old fogies," Dineli remarked, "playing such a baby's game as chess? I happen to know the wife of one of those fellows and she actually is so puerile that she still plays bridge!"

They picked up their cards and began to play.

"Hope Sedix doesn't start boring us with more yarns about that new baby of his," Yek thought as he concentrated his attention on his hand. But he had hardly registered that suggestion on his inner consciousness before Sedix started:

"You know that baby daughter of mine sure pulled a chunky one on us yesterday. As usual my wife and I went to our offices and left the baby in the care of the Televox. Of course my wife got a connection every hour and whistled for a report. At eleven o'clock Televox signalled back that the baby was lost. My wife told Televox to look in a dozen different places, but each time the message came back 'Baby missing!' Then wife began to get alarmed. Called me, all excited, and said she was sure the Purple Women had stolen our offspring. Made me quit work and dash home clear from Fresno. The wife ducked home, too, of course.

"For some time we couldn't locate the little eel until I happened to go into my bedroom and I heard a funny peep coming from under my bed. I looked, and there the little blatherskite was. She had climbed out of her crib and had crawled through three rooms and had hidden under my bed. Didn't cry a bit—just peeped and cooed like a cute little bird. Now what do you think of that for a girl only five months old?"

"Very remarkable," said Yek icily, but Sedix was completely oblivious of the sarcasm, and continued to recite story after story of his only child's prowesses, most of which Yek had heard at least a dozen times before.

They finished the first game, which was won by Tonida. Sedix complimented him with the remark, "You play an unusually tonic game for a man as young as you are. Specializing in mathematics, I suppose?"

"Yes, Sedix, I'm working for my D.M. degree at

Stanford."

"Tonida always was precocious," his mother proudly enthused. "He even worked out the formula for the hecantonicosiahedragon when he was only eleven."

"Talking about precocity," Yek interposed, "you should have heard the humpty-dumpty screamer my nine-year-old son Ralus pulled at breakfast this morning. His mother rebuked him for calling something a blink system and the little blatherskite came back at her with some yank about he meant to say it was egregiously inefficient and excerebrose. Then a few minutes after that, my wife got excited about her spacemobile breaking down and she forgot herself and said—"

"Excuse me, Yek," Sedix interrupted. "But I'll have to drop off at Fresno and we're almost there. Wingey wing! See you later!" and he rudely departed without waiting to learn what Yek's wife had said when she forgot herself.

About the Purple Women

WHEN Sedix declared he was going to drop off he didn't mean it literally. When a passenger wished to leave the bus he signalled for it to stop, he descended to the landing platform and winged off to the station. Once in the open air he could regulate the speed of his drop by means of his gravinul. A skilled winger could easily soar directly to his destination and could set himself down within a few seconds after he had left the spacebus.

The departure of Sedix broke up the game, so the remaining trio rose to leave the game room As they were about to pass into the main body of the bus, Yek noticed for the first time a man and a woman, each of whom was carrying a small, compact machine gun. This was enough to proclaim their vocations, even without their police uniforms.

Since 1944 the laws against selling weapons of any kind to civilians had been so rigidly enforced that it was unheard of for anyone but a soldier or officer of the law to be seen carrying a firearm.

"I suppose they were hired by the bus company for protection against the Purple Women," Yek remarked to Dineli. "Can you imagine anything more ridiculous than those two officers hoping to stop the Purple Women with those antiquated machine guns. They might as well use pea shooters."

"That's about what it amounts to," Dineli agreed. "Funny, isn't it that the police don't seem able to keep pace with the crooks?"

"It's always been that way. As far back as the days when men rode horses, the bandits usually had the fastest mounts and the most efficient weapons. And it was the same story in the days of the automobile. Why even that machine gun the police are using now was invented way back in 1931 by a crook. And the police didn't adopt it until the criminals had discarded it in favor of a more efficient weapon.

"Then came the organization of the Purple Women with their vibrators. After six years of terror, the authorities haven't the faintest idea of how these vibrators work. All they know is that with one of these compact little weapons a crook can either torture, paralyze or completely annihilate any number of human beings at will. Against them our police force is helpless.

"Did you say police force?" asked Tonida. "I think a better name would be police FARCE."

By this time they had found seats in the main body of the bus. Dineli and Tonida adjusted their ear phones and televiews, but Yek found his diversion by looking out of the window. His attention was arrested by a spacemobile which was flying close to the spacebus. Its appearance was so peculiar that it was conspicuous even among the thousands of other similar conveyances which crowded the air.

While its general conformation was quite similar to that of the standard types of spacemobiles there was something odd about it which Yek was not able to pick out at first. Then he noticed that the space in the rear where the rocket tubes protruded was outlandishly shaped. Even more surprising than that was the gas shooting out from these tubes, which was actually visible and was greenish in color.

The machine was close enough so that Yek could count the occupants. There were three of them. The side door opened and two of the passengers climbed out on the roof of the flyer. It was quite apparent that they were preparing to board the bus.

While the transfer of passengers from a spacemobile to a spacebus in midair was sometimes resorted to in an emergency, it was unusual enough to arouse special interest. A radio signal was transferred between the two cars to slow them down to the same low speed. Yek, therefore, watched closely as each of the strangers poised himself and flew onto the landing platform.

The Hold-Up

HE rose and moved closer to the entrance opening in order to scrutinize the new arrivals at close quarters. Thus Yek happened to be standing in the aisle when they came toward the spacebus. He looked first at their left breasts but instead of the names to indicate their sex, marital condition and occupations, he saw nothing but two unsightly blots of purple. It was a hideous color that gave the same unpleasant sensation to the eyes that a bad stench does to the nostrils. Yek also noticed that they not only wore the conventional helmet and goggles but the lower part of their faces were covered.

Involuntarily Yek gasped out loud, "The Purple Women!" and at the same instant each of the intruders whipped from under her coat a peculiar, cup-shaped weapon. In unison the women yelped, "Reach high, everyone!"

Yek, along with other passengers, lost no time in obeying this command. In the excitement he forgot all about his carefully planned scheme for outwitting the criminals. He was standing in the aisle a few feet away from the two Purple Women, who stood with their backs against the rear wall of the bus.

"Turn around!" one of them yelled. "Face the other way." Yek, in complying was forced to stand in such a position that his gas projecting device was useless.

One of the Purple Women remained in the rear of the bus where she could keep close watch on its occupants and her accomplice went methodically from one person to another demanding money and valuables. Yek was one of the first to be robbed and he gave up his watch without a murmur. He reflected that he was fortunate in having only a small sum of money with him, but soon discovered that this was a serious misfortune instead.

The rage of the Purple Woman when she learned that Yek had only a few dollars to contribute was frightful. She cursed him with foul, obscene oaths and leveled her cup-shaped weapon at him. There was a low whirring sound and immediately Yek experienced

a most excruciating pain. He began to tremble violently from a mysterious vibration which shook every bone, muscle and tissue in his body, producing a horrible, agonizing sensation.

"There!" snarled the Purple Woman. "That's just a tiny dose. Next time we catch you traveling with so little money you'll get a lot more, so take care!" and she moved on to the next victim.

It was at this point that the two members of the police force became aware of what was happening. They were gloriously courageous—those two defenders of law and order—especially the woman. Without a moment's hesitation she leveled her machine gun and sent a stream of hot bullets point blank at the nearest Purple Woman. The hail of steel jacketed slugs spattered against the crook's garments and mask like raindrops on a tin roof. They seemed to have no effect whatever, except to make the Purple Woman more angry.

She pointed her vibrator at the policewoman and it emitted a high-pitched screeching noise. Apparently she was using a great deal more power than she had when she tortured Yek. The body of the officer shook like a disturbed bit of jelly and within a second or two had completely disintegrated until not even a speck of dust remained of what was once a splendidly built human being.

Even in the face of this unspeakable evidence of the Purple Woman's invulnerable power, the male officer still had the valor to raise his machine gun. He didn't have time to pull the trigger, however, before the trembling death was upon him. This time the murderess elected to maim rather than kill, and the vibrator struck a middle note in its ominous song. The policeman dropped to the floor, completely paralyzed, except for his eyes which rolled horribly in their sockets and seemed to beg mutely for death.

Like a hungry wolf amid a flock of helpless sheep, the Purple Woman spun around and snapped out, "Does anyone else want a dose? One more false move and I'll vibrate the whole bunch of you to hell!"

As she turned to cover the entire bus with her alert eyes, her face came directly in range with the button on Yek's coat which was connected with his asphyxiating apparatus. Quickly, but cautiously, Yek brought his toes together. This completed an electric circuit and a tiny vortex ring of gas shot out. It was almost colorless and to anyone but a trained chemist who was watching for it, the ring was invisible. Yek noticed with disappointment that it went wide of its mark. But he shifted his head in the direction which he thought would correct the aim and again brought his toes together.

This time he scored a bulls-eye, and the arrogant female bully crumpled like a deflated toy balloon.

The other Purple Woman was behind Yek and he dared not turn to attack her, knowing that she would vibrate him at the first false move. But when she saw her companion in distress she hastened to assist her. As she strode along the aisle she had to brush Yek out of the way and at that instant a desperate ruse popped into his head.

He happened to be standing directly over one of the trap-doors. As the Purple Woman rushed past him, he grasped her belt and at the same instant turned his magnetizer full power into reverse.

With a sudden jolt, Yek and the Purple Woman were hurled through the opening. It was a risky thing for Yek to do, but he depended on taking advantage of the suddenness of his surprise strategem.

Battle in the Air

IT succeeded far better than he had hoped. In the excitement the Purple Woman let go of her vibrator. Yek's keen eyes saw it as it fell and he also noticed that it was dropping faster than the two human bodies, which, because of their flying suits, offered more resistance to the air.

Yek released his hold on the Purple Woman and with all the force he could muster winged straight downward in pursuit of the rapidly descending vibrator. When she sensed his purpose, his antagonist joined the chase.

As he dropped at a terrific speed, Yek—ever intent on knowing what was going on all around him, followed the advice he had given that morning to his son, and kept his head turning around almost like an owl's.

He noticed with some alarm that the Purple Women's spacemobile had altered its course and was descending rapidly, evidently with the idea of aiding Yek's antagonist.

The Purple Woman was a powerful winger and she had nearly overtaken Yek, when he caught up with the vibrator and snatched it out of the air. By this time he was within less than a hundred feet of the ground and descending at such a terrific speed that he was in danger of being dashed to pieces. Just in time he spread his wings and manipulated his foot fins in such a way that he shot skyward again in a graceful zoom. Then he soared swiftly downward, landing as gently as a feather.

A hundred feet away from him, the Purple Woman was also in the act of alighting. Immediately she dashed toward Yek in a series of awkward leaps. Yek pointed the vibrator at her and pressed everything he could find on the contraption. After what seemed an eternity he heard the shrill buzz and the whole atmosphere around him began to quiver.

The Purple Woman ceased her leaping but did not seem to be at all bothered by the vibrations. Instead, she was fiendishly amused. When she was about fifteen feet away from him, she halted and began to laugh. It was the most malevolent laugh that Yek had ever heard. It was the sort of laugh that is commonly ascribed to his satanic majesty when he gloats over the unfortunate souls who are being tormented in purgatory.

It was then that the dreadful truth flashed over Yek The Purple Woman wore an armor that protected her not only from bullets but also from the effects of her own diabolical weapon.

But Yek had learned that she was vulnerable in one place. She had to breathe. As she stood there mocking him with her wicked laughter, Yek took careful aim with his asphyxiation apparatus and brought his toes together. The laughter died as if her throat had been cut, and the Purple Woman seemed to melt like a jelly fish when it is thrown on the sunlit sand.

That left but one more menace for Yek to face—the woman in the strange spacemobile. She had delayed alighting, apparently at loss to understand what had happened to her companions. But now it was quite clear that she was coming straight for Yek, who realized that he would be caught at a great disadvantage, since he knew she would start to vibrate him long before he could hope to catch her within range of his asphyxiator.

She was just on the point of setting her flyer down a short distance away from Yek, when the air was rent by the ear-piercing shriek of a siren. Jubilantly, Yek understood what that meant. It was the police distress signal.

A Hero in His Own Home

ALMOST instantly the call was answered from six different directions and as if by magic, a number of police flyers loomed up—seemingly from nowhere. This distracted the attention of the remaining Purple Woman and saved Yek from the ordeal of a one-sided encounter with her.

With insolent disregard for the police flyers, the bandit guided her car right through their very midst. Bullets rattled harmlessly against the sides of her spacemobile. She played with the police officers, flying around their slow spacemobiles, which were capable of making only 1100 miles an hour. Then, when she had had enough of this horseplay, she shot out a dense cloud of dark green smoke through her rocket tubes and fairly melted out of sight.

One of the policemen spied Yek and set his spacemobile down in the field in which he was standing. He proved to be Zamot, a captain of detectives. When Yek pointed to the motionless body of the Purple Woman the officer expressed his astonishment and admiration.

"You've sure done something, Yek, old man," he cried. "This is the first time in six years that one of the Purple Women has been captured alive."

"I also captured a vibrator," Yek declared proudly. "I'm going to take it to my laboratory and see if I can't discover the principle so we'll be able to find some way to protect ourselves against it."

"Fine work," the officer complimented him. "If you want me to, I'll take charge of your prisoner and see that she is locked up."

"By all means," Yek agreed. "She will be insensible for about two hours, but after that you'd better watch out and see that she is carefully guarded. You know these Purple Women are bad actors and they are famous for their cleverness and resourcefulness."

"Don't worry. We'll clip her wings for her so she'll never vibrate anyone again."

"And, by the way, Zamot, you might also arrange to have the other Purple Woman taken off the spacebus."

"The other one? Do you mean to tell me you caught a brace of them? You ought to be on the police force!"

"No thanks," Yek smiled, as he thought of Tonida's factious reference to the "police farce."

Now that the excitement was all over, Yek suddenly became conscious of the fact that he was painfully upset. Every now and then his body would start trembling—due no doubt to the after effects of the vibrating he had received at the hands of the female bandit.

He was about to wing up to a landing and catch a spacebus for home when a familiar spacemobile loomed up above him. A moment later it had alighted and his wife rushed to him and gathered him into her strong arms

"Yek! My darling," she cried. "How you frightened me. You were splendid, Yek dear—but oh, I wish you would not be so reckless!"

"Then you saw it all?"

"Most of it. A smart reporter got the story almost the instant it happened and put it on the radionews. As soon as I learned it was the bus you had taken, I turned around and flew toward you, keeping the bus in focus on my teleview all the time. I caught the tail of your falling race with the Purple Woman and the fight you had with her on the ground. But you must be pretty well shaken up. Don't you think you'd better come home now, dear?"

"Guess I'd better," Yek murmured and he collapsed so that his wife had to drag him into the spacemobile.

When they arrived home, Kaza insisted on putting Yek to bed, though he protested that all he needed was a half hour's rest to make him fit again.

"You run along, Kaza dear," he told her. "I'll be all right. You mustn't neglect your work on my account."

"It's too late to make that Zion Canyon trip now, and there's nothing else that's particularly pressing, so I may as well stay home for the rest of the day and take care of you."

She directed Televox to prepare a light meal and after Yek had rested for a while, they sat up and ate their luncheon.

The Home is Saved!

SHORTLY after three o'clock Ralus arrived and was astonished and delighted to find both of his parents home. Explanations followed, and Yek had to spend the rest of the afternoon answering innumerable questions which his son asked him about every conceivable phase of his exciting adventure.

It was not until they were eating their evening meal that the subject of the trust deed, now almost due, again came up for discussion. This time Kaza thought of it first. "What about the trust deed?" she suddenly cried. "You didn't have an opportunity to do anything about it, of course."

"Great zenith, no!" her husband exclaimed. "This robbery business certainly ruined the day for me. I'm afraid that means we'll have to give up our little home. One more thing to blame on the Purple Women."

"Couldn't we do something tomorrow morning?"

"I don't see how that would be possible. Wupiz never shows up at his office on Saturdays, and it would only make him angry if I tried to talk business with him at the country club. He's the only one I know that has any capital to invest right now, and it's rather late to dig up someone else."

Just then a mysterious voice, seeming to come from nowhere, said, "Is Yek there?"

Ralus had just started to ask his father a question, when Kaza interrupted him, saying, "Please be quiet for a moment, dear, while daddy answers the radiophone."

Without talking into any instrument or even rising from his seat, Yek said quietly, "This is Yek talking."

His voice must have been caught by some hidden microphone.

"This is Quimid, Vice-President of the Pacific Coast Spacebus Company. I just want to notify you that your reward money has been deposited at the Government Bank."

"Reward money! What do you mean?"

"Don't you know? The reward for capturing the Purple Women."

"How much is it?"

"Ten thousand dollars. Didn't you hear the announcement? It was made this morning just ten minutes before the hold-up occurred. We offered $5,000 for each bandit caught after holding up any of our

spacebuses. You certainly are to be complimented on your promptness in winning the rewards. And in behalf of the entire law abiding citizenship of the United States we wish to thank you for the service you have rendered A loving cup is now being engraved to commemorate your great deed and this will be presented to you tomorrow."

Yek was overcome. All he could say was, "Thank you very, very much"

Both Kaza and Ralus had heard the entire conversation, of course.

Said Kaza: "How proud I am of you, Yek, dear."

Said Ralus, "Well, it looks as if our financial difficulties are over *at last*."

THE END

TO OUR READERS:

AIR WONDER STORIES with this number, modestly celebrates its third issue.

While we have heard from quite a number of our readers, we have not heard from as many as we would like to Remember this is your magazine. We want every reader of AIR WONDER STORIES to have a hand in the shaping of the editorial policy of this magazine Every reader, as a matter of fact, should, and must be an associate editor The editors themselves have no preference as to any particular type of story to give you. Only by hearing your expressions, can the editors give you what you want.

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Editor, AIR WONDER STORIES,
98 Park Place, New York City.

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The AIR TERROR

I cut through the upper wing and then as I tore back I cut it completely off. The great plane staggered as I backed away. Its pilot strove mightily to right it, but the ship reeled drunkenly to earth.

IT all came about through being laughed at. One resents having his pet hobby ridiculed.

"Why, Mr. Clare, your ideas relative to the airplane of the future are visionary and impractical. You speak of obtaining your gas from sea weed. How absurd!"

General Morley, at that time head of the aeronautical division of the United States army, spoke scornfully. He looked around at the other members of the board for their endorsement. Colonel Brandon, eyeing me coldly nodded his approval.

"Demonstrate your gas," challenged Colonel Brandon.

"You seem to forget, Colonel Brandon, that through the influence of Senator Ballantree I recently gave this board a chance to test it. But the board refused to comply with my conditions, to safeguard my secret. Now I will demonstrate it only in the plane. However, I grant you this much—the gas is carried in a dry, concentrated form. Here, gentlemen, in this small cube," I went on, taking the cube from my pocket and holding it aloft, "is enough material to make one thousand cubic feet of non-explosive gas by the addition of a little water. As I have stated before it has only one-fifth the weight of helium."

"Those are extravagant claims," observed Colonel Brandon.

"I am prepared to prove them—revolutionary as they are," I said. "But I lack funds."

"Uncle Sam cannot play Santa Claus all the time," smiled the general. "At present he is taking a rest."

"Besides, there are many failures in the airplane game, you know," remarked Colonel Brandon.

"You are right," I agreed with asperity. "But all the failures cannot be laid at the inventors' doors or on the machines themselves."

The general frowned and Colonel Brandon glared.

"Show us a working model," demanded General Morley. "Demonstrate your right to speak on this momentous subject."

"My record overseas during the late war and my work as an air mail pilot give me that right, General," I answered a little proudly. "As to my theory, I have demonstrated it to my own satisfaction. When I build another plane it will be large enough to carry me into the air. You scout my ability to construct a workable plane differing radically from those you have always known. You are afraid to get out of the rut. You are blind to the war cloud shadowing our horizon. I desire to give my plane to my country to save it from devastation."

"A very laudable ambition," smiled the general. "But have a care—the world crucifies its saviors."

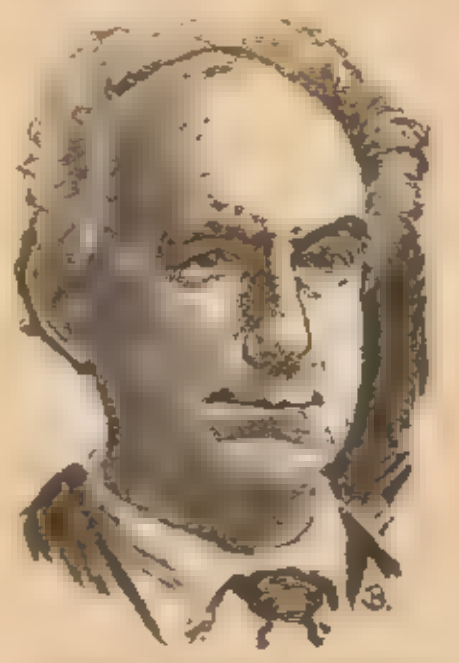
"I am master of the air," I declared stoutly, disdaining his sarcasm. "Some day you may acknowledge it."

A derisive titter followed this bold statement.

"I move that we adjourn this meeting," suggested Colonel Brandon. "It is clear Mr. Clare cannot substantiate his claims under the rules laid down by the board."

Colonel Brandon had bitterly opposed me from the first.

I had carefully explained my proposed plane, but they laughed wisely and shook their heads as I continued to plead my cause, and I caught one wise member of the board tapping his forehead significantly.



LOWELL HOWARD MORROW

I Turn Bandit

AT last, hot with anger, I arose from my place at the table and glared at the smiling and amused faces of the experts. I could tolerate their grins, but their sarcastic words of doubt stung me to the quick. I regretted that after my weary weeks of waiting Senator Ballantree had secured this audience.

"Gentlemen, I am through with you," I snapped, giving the senator a look of apology. "You are an aggregation of moss-grown antiques. You do not even know the first correct principles of airplane construction." They stared blankly. "The first airplane designers followed the build and the movements of the birds to a large extent. Am I right?"

"Quite right," agreed General Morley.

"Which is the heaviest section of a bird's anatomy?" I demanded.

"Why, its breast, of course."

"Correct. But so far airplane engineers have overlooked that fact. Therefore, the first lesson you experts have to learn is to undersling your motors and shift your center of gravity. Good night, gentlemen."

Discouraged and aflame with resentment I walked along with shuffling steps, my heart rebellious and bitter. I considered that the whole world was against me. What mattered it now that I cherished the D. S. C. given me for my work that terrible night in France when I rescued my buddie, Lon Grand, from his crashed and burning plane? What mattered my scars of battle, my months of sacrifice and toil when I sought to honor my country? Now that country's short-sighted servants turned me down. But despite all my resolve was unbroken—by hook or crook I would build the master plane of them all. But where was I to procure the necessary funds? And where

YOU of course remember the author of "Islands In The Air."

Here he is back with another excellent air story different from the first one and just as excellent. Here is an aviation story of the future, full of fight, adventure and good science. Indeed, the things that the author brings out in this story are no more impossible 50 years hence than the present airplane was impossible 50 years ago. And one should not scoff at the idea that one man single-handed could not have a successful battle with another nation. It all depends on the power of the instrument that he has.

Remember the Monitor, which in the Civil War changed naval warfare for all time. This was a simple invention and it certainly had a lot to do with winning the war. What our author develops in this story may play just as critical a part in some future contest.

build it secretly?

The night was dark as befitted my mood. Only now and then I glimpsed the stars through rifts in the clouds. I was disgusted with life. I had been buffeted by fate and denied justice. Society had spurned me. The thought surged through me like fire. I stopped and gazed about me in the gloom. I was athrill with a new idea—I would prey upon that society—my plane and I.

Finally I walked on reckless as to direction or destination. Presently I reached the location of magnificent homes in the suburbs of the city. Here was wealth and power to which I had appealed in vain. Long strings of Chinese lanterns suddenly attracted my attention. A party was in progress. Laughter and song drifted to me on the lazy breeze. The merry sounds jarred upon my nerves. What business had other people being happy when I was so miserable? But there was money there—money that I needed.

Something—I reckon now it must have been the devil—prompted me to leave the walk and wander across the lawn. Keeping within the shadows I soon gained a position where I could see and hear the gay gathering. Suddenly I heard voices near me, and peeping around a clump of shrubbery I saw a young man and a girl seated on a lawn seat. I noted the girl's rare beauty, the gold of her hair and the blue of her eyes which in the soft glow of the lanterns sparkled like jewels. The young man was comely with brown eyes and a little crop of a mustache. His next words electrified me.

"Yes, dear, I am ready to buy a plane at last. To-day I sold the Sea Urchin, and as I was late for the bank the whole twelve thousand is here."

He tapped his breast as I drew back, a hot surge of emotion sweeping me from head to foot. Twelve thousand dollars! With it I could succeed!

"You should not carry so much money around with you," said the girl in alarm. "You might be robbed."

I gazed off over the crowd and perceived that at least one of the guests was an aviator, for a plane stood on the lawn back of the mansion, its white wings visible in the dusk. The plane had been turned after landing and now stood facing the golf links. It was then that the tempter beckoned. For the first time in my life I lost sight of the moral side of life and became a criminal in thought. The urge to build a super-plane had driven all other considerations from my mind.

The lovers were in a secluded nook. I tied a handkerchief over my face, drew my revolver and stepped before them.

"I'll take that twelve thousand, Buddie," I said quietly. "Hand it over and make no outcry or I will kill you."

The girl started to rise, then settled back staring belligerently as I flourished the gun. But the young fellow slowly reached within his coat, drew forth a fat envelope and handed it over without a word.

"Many thanks, old man," I said. "Consider this only as a loan. Both of you keep still for five minutes."

Then I leaped away. Straight for the airplane I ran. Nobody seemed to notice me, and I was seated in the cockpit holding to the stick and pressing the starter button before I heard a cry of alarm.

The motor responded, the propeller whirred and I streaked away over the lawn. A run of a few rods, then I gave her the gun and zoomed into the air at a dangerous angle. Rapidly I mounted in a close spiral. As I circled back over the lawn I saw the guests, gathered in groups, gazing up at me and gesticulating madly. But I was soon lost to them, and the lights of Washington blinked out in walls of whirling vapor. In a few minutes I was speeding above the clouds with the soft starlight upon me.

Now that I had escaped where away, I wondered. I had no plan other than to get far away with my plunder. I examined the gasoline gauges. The tanks were nearly full. I had enough fuel for a long voyage. And then I thought of a haven for my operations. Several hundred miles to the south on a peak of the Great Smoky mountains was a freak of nature—a level plateau of rock perhaps an eighth of a mile long and nearly as wide. Once while carrying the mail I had made a forced landing there. It was inaccessible from below, for the cliffs rose sheerly two hundred feet on every side. Best of all, on one end was a sheltered nook formed by a great overhanging rock which was screened by a cluster of pine. Here I could house the plane safe from the eyes of some aviator who might chance to wing his way over the peak. Here I could construct my plane.

But I needed help for the task. Slowly and with great risk I must transport my materials to the mountain top under cover of the night. I must construct a small machine shop with all its accessories. And I could not do all this alone. In my perplexity I thought of Lon Grand—good old Lon. He would do anything for me. Although he was suffering from the aftermath of many wounds and his mind was somewhat clouded by shell shock he was an expert airplane mechanic whenever his wandering fancy allowed him to work at it. But he was an unreliable employee, sometimes wandering away from his work for months—and nobody knew where he was. However, I felt sure that he would stick by me.

Well, without delay I sought Lon, found him and he agreed to my scheme with enthusiasm.

The Super-Plane

WE will pass over the months of lonesome toil that followed, the heartbreaking disappointments and failures, my many narrow escapes from the searching hands of the law, Lon's many moody spells when I had to nurse his ambition and watch him as I would a baby. For more than two years we labored there on that gray mountain top. But at last it was done—the scourge of the air—and its performance exceeded my expectations.

When at last all was ready I seated myself in the driver's seat, started the motors and seized the controls. Straight into the sky we shot at marvelous speed. Over my shoulder stood Lon, his great eyes shining with wonder and delight. Then I tried out the plane on the level, my gyroscope maintaining it perfectly. And we descended vertically—rapidly or slowly as we chose. Had anything gone radically wrong with the mechanism of the plane I knew that it would not crash, for housed in the wings, in sections of the frame, in the casing of the cabin and in other special parts made to contain it was my super-gas, non-inflammable and of tremendous lifting power. How I thanked my lucky stars that although I had given up my studies in chemistry to go to war I had resumed them when I returned. While this gas was not strong enough to lift the plane and its load, it rendered it buoyant so that the motors had only to drive it through the air. This I knew to be the airplane of the future, the super-plane which I had endeavored to give to my country.

The plane was armored well for warfare. On both top and bottom, as well as at each end, was a long, sharp steel spike for ramming purposes. The cabin and all vital parts were protected by sheets of steel backed by aluminum and asbestos. The four propellers, one at each end, and one top and bottom, were protected by machine-gun fire. In sailing on the level the propeller on the prow was pulling the plane forward, the one on the rear was driving it ahead. Those top and bottom—used only in ascending and descending—had a similar office. The wings, resembling those of a bird but comparatively small and to be folded back on occasion, were made of metal. The tail, flexible and expanding, followed that of a bird in flight as near as it was physically possible to make it. The plane could not go into a tail spin or a nose dive because the center of gravity—its greatest weight—was underneath, like that of a bird. And the construction of the tail enabled one to dive or ascend at any angle he might choose.

But now that I was ready to make the purblind servants of my country pay for their folly I was reluctant to do so. My madness was over. I had built my plane. Even with Lon's skilful help the triumph was mine. Besides, my conscience had been newly awakened. I longed to get back into the ranks of men, to do some good with my plane, to make amends for my folly. But I could not see my way clear to do so. I was an outlaw and justice would not forget. Perhaps some day I would give myself up. So I foolishly postponed the day of reckoning. The spirit of revenge urged me on and an opportunity to continue plundering whispered its alluring message.

How easy it all was. Locks and doors are not on the roofs of business blocks and banks, and scuttles are seldom locked, or if locked are easily opened. And I was able to land anywhere, even on a roof but a rod or two square. So the pickings were easy. Unprepared for robbers from the sky the police were nonplussed. They knew not where or when I would strike. Always I flew without lights and dropped like a plummet from the sky. To satisfy my foolish vanity I always left my card on which I wrote *The Air Master*. On the rare occasions when I obtained a newspaper I read accounts of my exploits and wild descriptions of my plane which many had glimpsed. But after a few months the people woke up and the press of the entire country called loudly for an air police patrol for all cities. And soon on my nightly errands I beheld the lights on their clumsy planes darting above the towns. I laughed at their maneuvers. I could dodge them so easily.

Lon, patient and often in a daze, asked no questions and made no comments. I often wondered whether he suspected the nature of my frequent trips to the north. Carefully I strove to keep it from him, for I dreaded the accusing finger of his scorn. Lon was pure gold.

Chase!

ONE mellow night in the early fall I set out on a mission of restitution. For the first time Lon asked to accompany me, and I had a hard time to convince him that it was better for me to go alone. He seemed to sense danger of some sort and of late he had been acting more queer than usual. At length he bowed in silent agreement and I set out.

Since the night I stole the money and the plane I had not seen the girl of the golden hair, but often I had seen her in my dreams. With me I carried twenty thousand dollars in two packages—eight thousand for the owner of the plane I had stolen, and the remainder to reimburse the young man of the Chaplin mustache. I considered the girl the best medium through which to reach those persons could I but find her. These few short months of hectic crime had saddened me and taught me a lesson. I was tired of it all.

Taking a long chance I flew low above the girl's home, dropped lower and lower unobserved, for the mufflers reduced the motors' noise to a minimum. I noticed a large plane standing on the same spot that had been occupied by the one I had forcibly borrowed. I saw no one about, so I landed near it and carefully approached the house. I had resolved to ring the bell, ask for the young lady and boldly deliver the money into her hands. If she should not be there, then to some other member of the family. Should my plane be discovered during my short absence it would fall into the hands of the police and I would become a fugitive on land with capture almost certain. But once more luck was with me. Rounding the end of a hedge I almost stumbled against the girl I sought. She was sitting beside the young man I had robbed in much the same attitude I had beheld them more than two years before. The young man wore the uniform of the police air patrol, and the bright wings of an officer gleamed upon his breast. I wore no mask, but it was evident they did not recognize me as the infamous air bandit.

Bowing to the young lady I took the packages of money from my pocket.

"Kindly convey this to the owner of the airplane that was stolen from this lawn about two years ago," I said, tossing the money in her lap. "And you, my dear sir," I continued, handing the staring young fellow the other package, "be kind enough to accept this as restitution for the money you loaned me that night."

I turned, sprang around the end of the hedge and ran for my plane. But I was not to escape so easily.

"The air bandit!" I heard the young man shout, and almost with the words a bullet winged past my ear. I looked back over my shoulder. He was coming after me firing as he ran, and the girl was close at his heels. Fortunately his aim was bad, but suddenly from nowhere, it seemed, servants of the estate came running to his assistance.

All might have been well had I not stepped into a depression of the ground and turned my ankle. I stumbled and fell within a rod of my plane, but as I rose the air patrolman, clubbing his pistol, was upon me, firing as he ran, and the girl was close at his heels. on again, the girl at his side. She clung to me desperately as we staggered forward.

At last I felled the young airman with a blow to the jaw, threw off the clinging hands of the girl and reached my plane. In another minute I was shooting skyward like a rocket, but even as I did so I saw the airman rise to his feet, and followed by the girl, make for his own plane. In a few minutes they were in the air and climbing steadily. I smiled, for before they could gain altitude I would be off and away at a speed of nearly four hundred miles an hour. But I had reckoned wrong. I soon became aware that the air above and around me was swarming with planes of the police air patrol. Evidently they had spotted me and followed me as I flew over the city. My errand of restitution was likely to cost me my liberty—perhaps my life.

My good resolves, my plan of reform, faded away

in a red mist of hate. They sought my life and had no mercy. What chance had I, anyway, I asked myself, at the hands of justice? She was blind and deaf and dumb and never forgave her erring children. Now they were pecking away at me with machine guns, the bullets rattling against the struts of my plane and drumming against the walls of the cabin. My upward retreat was cut off by two planes which were nosing down toward me. I knew that I could whip them, but I desired to escape without bloodshed. Still others were closing in from all sides. I saw that I must fight; that I must send down some of my foes. How willingly I would have surrendered could I have been sure of a square deal! So far I had not shed blood in my life of unlawful gain. I shrank from it even now.

The steel points on my plane could rip through cloth, or wood, or steel. My landing gear folded up out of the way of the lower point which could be made terribly effective in attack. I had built the whole plane the same as I would have done had the government approved my idea. So I darted aside and allowed the two planes to spend their energy in the dive. Then as they flattened out below me I dropped down with terrific speed. The pilots of the police planes, evidently dazed by this novel method of attack and in the dark as to my intentions, maneuvered to elude me. Too late. In a twinkling the steel-pointed bottom of my plane had ripped away a wing of the nearest machine. I turned sharply as it went plunging earthward. Before the other pilot had time to dodge me I tore off his wings and he followed his comrade down to earth.

I Turn Kidnapper

I NOW darted upward again intending to get above my enemies and speed for home, for I knew that no plane could follow me, but to my dismay I saw that my way was again blocked, this time by three planes, and by their lights I saw others converging toward the battle area. And now with reckless daring the three planes bore down. To avoid them and gain a point of advantage I dropped downward only to find a large plane directly in my path and so close that I could not avoid striking it. As I accelerated my plunge and the steel point tore through the flimsy wings I was horrified to discover that it was the plane of the young airman and the golden-haired girl. Now as their plane pitched crazily and began to fall the young man, his parachute on his back, rose from the cockpit and prepared to leap, motioning the girl to follow. But before he could leap flames swept back from the motor and enveloped him. The girl was struggling desperately with her safety belt. With the risk of being crippled by the falling plane I kept pace with it and kept drawing nearer. Just as the flames reached her I leaned over with my knife and cut the stubborn belt. Then I caught her beneath the arms and drew her aboard my own craft. Through a pall of smoke and flame I caught a glimpse of the airman as he went over the side.

By this time my enemies were pressing me close, but having cleared the burning plane we dropped rapidly until we merely skimmed the earth. The police planes dared not follow. We darted between the trees fringing the golf links until the sky above was free from the enemy. Then we soared toward the stars as though projected from the muzzle of a gun. Back over the lawn the sky patrol was forming for the pursuit. As I had gained the desired altitude I forced the motors to their utmost and soon the lights of the pursuing planes drew dim, wavered and were lost in the gloom.

Until the lights of the city had winked out in the darkness to rearward the girl maintained a stoical silence. She sat staring at me intently, her blue eyes flaming with hate.

"You—you monster," she gasped at last. "You have killed Lieutenant Price—a brave man, a man sorely needed by his country."

"Pardon me," I said, cringing under her intense gaze, "I tried to avoid striking your plane."

"You lie!" she cried. "You are a murderer and a coward!"

My eyes fell under her fierce stare. I would rather have died than be so accused by this girl. I realized bitterly that more than ever I was outside the law's pale.

"I plead guilty to being a coward," I said contritely. "But I am no murderer. And I earnestly desire to quit my lawless game."

She smiled scornfully.

"Where are we going?" she asked, gazing about the cabin in wonder. "Why didn't you land me so that I could go home?"

"A coward is not always a fool," I laughed bitterly. "From now until dawn all the searchlights in Washington will be combing the sky for me. And for days the air will be thick with planes of the air patrol."

"And when they catch you you will die," she asserted.

"No plane on earth is a match for mine," I said confidently. "I need not remind you that I am master of the air.

She gazed at me with widening eyes which showed no trace of fear—only wonder, curiosity and loathing.

"You shall pay dearly for all of this," she went on at last. "My father, Colonel Brandon, is a power in this land."

"Your father!" I said aghast. "Is Colonel Brandon your father?"

"Yes. He is chief of the first air squadron of the army."

"I have met him," I said, staring hard at her and wondering what imp of fate had led me to his mansion that fatal night. "He is indeed a power, but that power is often misplaced."

"Misplaced?"

"I believe that is the correct word. Your father was a power in the government's rejection of this plane."

"We all feel that was a mistake. I am sorry, but he did not know."

"Exactly. Pardon me, but like many other dumbbells connected with our government he deems himself too wise to learn."

"Why don't you land me?" she demanded imperiously. "I know you can land anywhere at any time with this plane."

"It would be too risky. I don't want to subject you to unnecessary danger. So I have concluded that you are to become my guest for a few days. Besides, I rather like you.

Her eyes flared with indignation.

"You mean you will take me to your home!" she exclaimed incredulously. "The police have long maintained that you have a secret haven."

"Wise police," I laughed.

"Then in a few days you will take me home?"

"I will. And in the meantime have no fear. I will treat you as a gentleman should."

"A gentleman," she sneered. "Oh how I hate you! Hate you!" she finished.

"Thank you, Miss Brandon. Your interest is appre-

ciated."

"And when I return home I shall lead the air patrol back to your infamous lair."

"You will not."

"Why?"

"Because it is not in your nature to betray a trust. I am trusting you not to betray me."

Her eyes fell and she compressed her lips. I saw that I was right. She was not ungrateful. But she refused to talk further. She sat staring disconsolately at the floor, and I saw that she was having a hard battle to keep back the tears.

War Clouds!

IN due time we arrived at my rocky home. I made her as comfortable as possible, and she did not complain. Lon looked at me queerly, a question in his great, luminous eyes, but as usual he held his peace and made no comment.

The next morning after breakfast she showed keen interest in her surroundings, asking numerous questions. I commanded her never to venture beyond the overhanging rock for fear some passing plane might discover her. Lon and I never showed ourselves on the plateau in daylight, and my constant dread was that some day some aviator might take a notion to land and explore this unique mountain top.

Thus two days passed. The scorn and the haughtiness had left Miss Brandon's eyes and she began to talk in that tone of relief one assumes when a dreaded danger fails to materialize.

We were sitting on a rock out in the edge of the pines. The warm sunshine filtered through their branches where the birds were singing merrily.

"To-morrow, maybe," she said suddenly, "I will be going home."

"Perhaps, Miss Brandon. But really there is no hurry."

"Pray do not mock my misery," she reproved. "And please take me back home. I cannot remain away longer in times like these. Father, I know, is frantic with anxiety. He needs me. Any day he may be called to take command of his squadron. Any day some unwise and fiery words may explode the magazine of war."

"War!" I exclaimed incredulously.

"Haven't you heard?" she cried in surprise. "Nations across the sea are lining up against us. We have granted every honorable concession, but there seems to be no way of preventing war. Word has come from reliable sources that already a large air armada is forming on the other side to swoop down upon our seaboard cities."

"My God!" I cried, getting to my feet and staring down at her. "I expected it. And yet it seems unthinkable."

"The Great War seemed unthinkable until it came," she reminded me simply.

"Had they listened to me I might have saved the day," I said, pointing to my plane housed under the rock.

"Do you consider our situation hopeless?" she asked in alarm.

"It is desperate, to say the least—thanks to short-sighted officials among whom—if you will pardon me—is your father. Our planes are woefully inferior in numbers and equipment."

"But we have some good ones, and their pilots are skilful and brave. My father is an able commander. Lieutenant Price was like him—noble and brave," she added sadly. "Father had secured him a pilot's berth in the first air squadron, and his future was bright."

Her eyes filled with tears and she looked away that I might not see.

"Forgive me, Miss Brandon, but I believe that Lieutenant Price was more to you than a friend."

"We were to be married in the spring," she said blushing.

I stood looking down at her, a wild hope surging through me, but I stifled it resolutely. What was I that I dared dream such things—an air bandit—who had sinned beyond pardon!

"Tonight I will take you home," I said with sudden resolution.

"Oh, thank you," she said, springing up and seizing my hands in a burst of gratitude. "I am so glad. I shall speak for you to my father and—and who knows—you may yet get a chance to reform. You cannot be so awfully bad."

I bowed my acknowledgment, then turned away thankful for her gracious words.

Early that night, just as the stars began to blazon the sky, we made ready. For the second time Lon asked to go along. During all the weary months since coming there he had not left that lonesome rock. So I could not refuse his request. We soared high—so high that we shivered with the cold, but I knew that the air police everywhere were on the lookout for me. But when we had obtained a position directly over Colonel Brandon's mansion we dropped straight down. No planes were in sight. The air was still. A solemn hush was brooding over the world. A calm whose very completeness chilled my heart seemed to be soothing it to sleep. Perhaps my enemies were lurking in the shadows waiting for me. But I subdued this silly fear. They had no cause to expect me. They could only guess that I had rescued Colonel Brandon's daughter.

Anyway I was reckless of consequences—so reckless that I shot the machine down upon the front lawn within a hundred yards of the house. As I helped the girl from the plane I saw two men seated under the porch lights leaning toward each other and apparently engaged in earnest conversation. One of the men wore the uniform of the air patrol and his head was swathed in bandages!

The girl gave a gasping cry.

"Thank God!" she murmured brokenly. And then I saw that it was Lieutenant Price.

"Wait," I said hoarsely when she made ready to hasten away. So perverse is human nature that I regretted Price had been saved, yet was glad for her sake. "Go to those men, explain briefly and then come back and tell me whether war has been declared."

She hesitated, looking first at the men then at me. Lon sat silently regarding us.

"Go on—I will take the risk," I said. "Make some excuse, but come back alone."

I Enlist

IN a fever of impatience and anxiety I waited I watched her run up the steps, saw her father and her lover rise hurriedly and embrace her. Then for a few minutes I knew by her gestures that she was making an excited explanation Suddenly her father handed her a newspaper which she merely glanced at, then she rushed down the steps and ran toward me. But in a moment she was followed by the lieutenant, who by the aid of a cane came limping along shouting

for her to come back.

"It has come," she panted, thrusting the paper into my hand. And there before me in great black headlines was the awful truth—*war had been declared!*

I had no time to learn more, for Lieutenant Price was close upon us calling loudly for me to surrender.

"Give her the gun, Lon," I shouted as I leaped into the plane and pulled the ascending throttle, watching the lieutenant over my shoulder as I did so. As the plane shot into the sky I looked down into his white, upturned face and waved my hand in salute.

"We fooled them, Lon," I said, turning to him. But I stared aghast.

I was alone! Intent on watching the girl and the lieutenant I had forgotten Lon. Doubtless under one of his spells he had slipped from the machine unobserved. I could not go back, for soon the air would be filled by planes of the air patrol. Cursing my stupid folly in letting him get away I plunged still higher. Dear old Lon—as faithful a friend as man ever had. It was to be years before I should see his face again when he was discovered under startling and remarkable circumstances by which his clouded mind was cleared—and— But that is another story.

On the way home I read the whole terrible news. War had been forced upon our country, and she was almost defenseless in the air—and because of this alone the enemy had struck. Our planes, few in number and poorly armed, were weak compared to the foe's powerful bombers and fighters. Our cities lay open and supine to a shower of fire and death from the sky. The day I had feared had come, and I was helpless to do anything. If they had only listened to me how different would be the prospect! A fleet of my master planes could repulse the combined air raiders of the world.

Reaching home I housed my machine and went to bed. But I could not sleep. Lon and his uncertain fate, and pictures of war in its horror of blood and carnage rose before me. After tossing about for an hour I rose, dressed and went out under the stars. Dawn was tinging the east and in its pink depths my imagination pictured black swarms of enemy planes winging their way over the sea to crush us. And in dismay I imagined our puny aerial fleet trying to stop them. In frenzied fancy I saw the death of many brave men, saw the slaughter of women and children cowering in their homes while their roofs blazed with fire.

For a time I was overcome with horror, despair and remorse. If I had only been more patient I might have won out under the law and now in this crisis I might be useful. I might have saved the day. The thought drove me mad. I swept the starry heavens as though I would challenge and defy the universe. I burned with a sudden resolve. *I would save the day!* I would make good my claim. For was not I master of the air? I would meet them and fight until overwhelmed. I would redeem myself.

Afire with my mad resolution I began my preparations at once. I filled my *atoline* tanks and went over the motors carefully.

That evening as the sun set in a crimson sky I rose into the air. Lonely as this rocky home had been I gazed back on it with a pang of regret. It had sheltered Lon and me. It had seemed to appreciate me. It had been kind. I knew that I would never see it again.

Before I had been in the air an hour the full moon was bathing the earth in a soft glow. The night was still. I seemed to be afloat in space. All about me was peace. It was hard for me to realize that I was bent on an errand of destruction: that brother humans in madness and hate would soon be seeking my life.

But at last when I soared above the streets of Washington all was changed. The streets were teeming with milling masses of men, women and children whose cries and shouts rose to me in a hoarse murmur of fear. I dropped lower over the avenues, even entered some of them, dropping as low as the second-story windows. Here I heard the newsboys shrilly proclaim the dire news that already Boston had been bombed, its public buildings destroyed, thousands made homeless, and that the city had been surrendered to the enemy.

I also learned that the enemy was mustering his planes to move on New York. Colonel Brandon, with the first air squadron, supplemented by many private planes, had gone out to meet the foe. Somewhere above Connecticut's hills he grimly awaited the enemy.

Battle At Last!

IT was enough. I waited at hear no more. Amid the excited cries of the people, who pointed at my machine and waved their arm excitedly, I shot upward far above the tallest buildings and set my course to the northeast.

In less than an hour I came upon the fleet of defense. Back and forth the planes moved in battle formation. I moved among them, drawing their excited attention, but I was received as a friend. Doubtless Colonel Brandon had recognized me and had radioed that although I was an outlaw I was an American and was to be let alone. I was mighty thankful, for had I been attacked it would have disorganized my plans.

For an hour I flew among them with no enemy in sight. At last impatient at the delay I flew to an altitude of ten thousand feet, then sped east. In ten minutes I saw them coming, flying rather low, but in splendid order. They formed a mighty array—the whole heavens to the east seemed to be filled with them—a veritable cloud of death. The roar of their motors blended in a dreadful dirge, which to my overwrought senses sounded like the voice of doom. Flushed with victory, conscious of their prestige, confident of success, they came swiftly on with gleaming lights disdaining concealment or surprise.

I looked to the west. Our planes had sighted them. They were coming on boldly, but with no lights—coming on like lambs to the slaughter. I had never prayed. I knew nothing about God or heaven, but then and there I stumbled through an agonized plea for my countrymen. Earnestly I asked the ruler of the universe to help them.

I waited until the main body of the enemy was directly under me. Leading the van I picked out a giant plane. This I recognized by its position as the flagship of the fleet—doubtless the ship of M. Itso, the noted Oriental ace, and the chief of the fleet.

My time had come—the hour for which I had yearned with all my heart and soul—the opportunity to demonstrate in battle the superior merits of my invention in defense of my country. I was athrill with a mad joy. I was about to die. Peace and contentment were to be mine at last. Such a death I would welcome.

With awful swiftness I approached the flagship. The roar of the motors below was deafening, the colored lights of so many aircraft bewildering, but I allowed nothing to detract me from my aim. Straight in its center I cut through the upper wing, then as I turned back tore it completely off. The great plane staggered

as I backed away. Then plunging forward like a mighty battering ram I struck the lower wing and cut it in twain. The plane swung out of control. Its pilots strove mightily to right it, while their companions emptied their automatics at me. However, in a moment the plane lurched, then dove straight down. For a fleeting instant as the other planes roared past I caught a glimpse of the once noble ship reeling drunkenly toward the earth.

Halted by this sudden calamity and for a few minutes confused, the enemy paused, swung back and came after me furiously. One appeared directly over me, but even as its gunners trained their machine guns I shot up through their wings, ripped them away and sent them lurching down to join their commander. As the others tried to close in I backed away, thus confusing them. Then I zoomed above them. Three of their speediest planes followed. I led them on until they were beyond supporting distance of their comrades, then I charged them one at a time. Darting here and there I cut them to pieces and sent them down whirling masses of wreckage. I dropped down once more then drew off as half a dozen planes attempted to charge me. Again I retreated, their machine-gun bullets rattling off my armor harmlessly. Once more I turned suddenly, rammed them, retreated, struck them top and bottom, confused them by my sudden and unexpected maneuvers until all were sent crashing down.

Far below the enemy was reforming. Planes were circling here and there, getting into position again. By their flashing lights and the light of the moon I saw another large plane take position at the head of the squadron. I got above it. Like some black monster from the world of darkness I dropped swiftly, noiseless as a phantom. Before they were aware of my presence I struck the plane a terrible blow. It reeled, and before it could recover I struck it again and again while its companions tried to get into position to protect it. At last it plunged down and I again drew off. This time nearly the whole fleet seemed bent on following me. I saw that they were becoming demoralized by my swift and peculiar onslaughts. Again I led them a merry race. They could not overtake me. They could not get above me. They could not anticipate my moves or guard against my attacks. Only when I enticed one or two away from their fellows I struck. They fought bravely, stubbornly, but they had no chance. The terrible steel spikes gored them like the horn of an angry bull. With bewildering speed and uncanny aim I rose against them, fell upon them, turned in small circles and tore off their wings. My movements were so swift and unexpected and the evolutions of their planes so awkward and slow that I had them at my mercy. Glancing down exultingly I saw that the ground was becoming littered with the wreck of the enemy.

I was drunk with the spirit of battle. Working my stick with reckless ferocity I yelled at my foes, taunted them, led them on and dared them to come and take me. But of course the general tumult, the roar of the motors and the crash of impact, the sputter of machine guns and the rending and splintering of the wings prevented my voice reaching them. But it didn't matter. I was slaying my country's foes. Their whole fleet was bent on my destruction, but they could not reach me. Give me a little more time and I would have them all. Surely I was master of the air. But I realized that soon I must die. Death grinned at me from every side, but I laughed in his grisly face. But the planes came on and on. My very victories were weakening me. I could not long stand the mad pace. Soon I must be crushed by weight of numbers and sent crashing down to my doom.

The Air Terror

THEN suddenly the planes began to draw off. They paid no attention to me, and looking below I saw the cause. The enemy lights were wig-wagging frantically. They were reforming and I understood that my attackers had been radioed to get back in the line. Off to the east was the poignant reason—the American fleet was nearing the scene.

Soon they were engaged in a desperate battle. I saw the lights on the planes dip up and down, charge and retreat and spin in dizzy circles. My countrymen were fighting with a skill and daring worthy the traditions of the American ace, but they were hopelessly outnumbered, and I realized the bitter outcome of the struggle. For a few minutes I sat gazing at the spectacle, fascinated by the play of the planes, darting about like grotesque ghosts in the shimmering moonbeams. The roar of the mighty conflict rose to me on the wind, sounding like distant surf pounding on the shore. Every little while I would see a burning ship go whirling down to earth. I was witnessing the first real air battle of history. And here America, who cradled the airplane, must go down in bitter defeat! The thought set me on fire. The last remnant of my reason fled and I became mad. I would kill, kill, kill. And in my rage I would be content to give up my life.

I know little of what took place during the remainder of that historic fight. It comes to me in hazy fragments as I write, and but for the notes taken at the time by friends I could not tell my story. I only know that I seemed to be in the center of a revolving, seething, blistering hell—screaming my challenge, ramming, retreating, surging forward, ascending, descending, sending our foes crashing to earth, asking no quarter and giving none. Suddenly I realized that more than two-thirds of the American planes were down and over half of the enemy. The latter now drew off, reformed and then came tearing back against the American line.

Colonel Brandon's plane was still intact. I recognized it by the painted stars and stripes. I knew that likely Lieutenant Price held the controls. Even as this thought surged through my brain I saw the lieutenant's bandaged head peep a moment from a window.

Now the battle was on once more in all its fury. I saw with dismay that the enemy was concentrating his attack on the Colonel's plane. By adroit maneuvering they were seeking to separate him from his squadron. Dipping and banking and zooming upward, then looping back again he was striving to escape their net. By this time my plane was badly battered by bullets. Some of the gas chambers had been penetrated and emptied of their contents. The frame was bent and twisted by its terrific encounters, my forward propeller was out of commission and my *ataline* was running low. I realized that this would be my last attack. Here in the midst of it all I hoped to meet my end.

My onslaught was as terrible as it was sudden. In a few minutes I had disposed of three of the planes. Earthward they plunged in spirals of writhing fire, illuminating the ground with a ghastly glow. Now, however, a chance shot broke my rear propeller. I could only rise above and hurl myself down on our foes. It was then that three more planes closed in on the Colonel and his heroic pilot. They were below me.

Like a thunderbolt I hurled myself down on one of the planes, crashing clear through its wings. As it fell I swung up against the wings of another, shearing them off close to the cabin. But even with these victories I saw that the odds were too great for us. The remaining plane was getting the best of the Colonel, and others were coming to its aid. In desperation I dove down on this plane with all the power of my motors. The impact was terrific. I broke the plane almost in two. Its wings crumpled and flames leaped from its motor. As it plunged I had difficulty lifting my plane free from the wreckage. As I did so I accidentally struck the Colonel's plane which, badly crippled, was slowly falling. In vain I tried to extricate myself from his landing gear, but I was wedged in tightly and the crippling of both forward and rear propellers prevented my withdrawing horizontally. Faster and faster we fell, the tremendous weight of the flagship pressing upon and carrying me along with it. In the last desperate grapple with the enemy we had lost altitude so that now only a few hundred feet separated us from the earth.

We seemed to be ages in falling. I knew that it was all over with me, and was glad for it would settle my problem. And then the grinding, rending shock, the poignant pain, the flashing lights and blood-red mist that was swallowed up in darkness.

I revived in a hospital. The nurse said that I had been there six weeks. It seems they had taken me from the wreckage of the planes a mass of broken bones and lacerations, but the surgeons had patched me up pretty well, though they said that I would never walk again. The nurse informed me that Colonel Brandon and Lieutenant Price, the shock broken by my plane, had escaped with minor cuts and bruises. With this meager information I had to be content, for the nurse gave me a sleeping powder. But the next day Colonel Brandon and the young lieutenant accompanied by Miss Brandon carrying a huge bunch of roses, came to visit me.

The Colonel took my good hand in both his own and gazed down on my patched face compassionately.

"You won, old man," he said at last. "The enemy has left our shores, and the war is over. Pray accept my apologies."

"War—has left our shores," I said unable to believe my senses.

"Yes, after your last spectacular attack the enemy became discouraged and withdrew toward Boston. Our forces, reenforced by the second squadron and private planes, followed and won a sweeping victory. Your priceless plane was salvaged and copied. Uncle Sam will settle with you for that. Working night and day in many factories we are turning them out by the hundred. So that with them we are sure to win the war if they ever attack us again."

"I am glad," I said fervently. "But it all matters little to an outlaw," I added sadly.

The Colonel laughed. He turned to Lieutenant Price.

"Lieutenant, what chance for a pardon do you think an outlaw has who has saved his country?"

"We might envy Mr. Clare the reception that awaits him," smiled the lieutenant.

"He deserves it," added Miss Brandon, smiling at me and arranging in a vase the roses she had brought.

And so my tale comes to an end. How the war was won is history now. I am proud that I had a humble part in the victory. And I am happy to add that my pardon was complete.

I am content now—happy as I go about the factory in my wheel chair looking after the construction of my beloved planes.

THE END.

WHAT IS YOUR KNOWLEDGE OF AVIATION?

Test Yourself by This Questionnaire

THE questions given below are taken from the stories in this issue. They will serve, by your ability to answer them, to test yourself in your knowledge of aviation. By thus testing yourself, you will be able to fix in your mind a number of important facts of aviation that are presented by the stories.

The pages, on which the answers are given, follow each question.

1—What purpose would a tunnel through a dirigible serve? (Page 200)

2—What is the average fuel consumption per horsepower of an airship? (Page 202)

3—What are the means of reducing a plane's resistance? What would be used as an accessory source of power? (Page 206)

4—If a plane is climbing steeply and the gas is cut off, what will happen? How can the situation be righted? (Page 216)

5—What are the chemical characteristics of helium gas? (Page 241)

6—What is one of the great disadvantages of present-day airplanes? What other inconvenient conditions does it bring into being? (Page 251)

7—On what physical principle is the rocket based? (Page 260)

8—How does air resistance against a plane vary with regard to the velocity? (Page 260)

9—Upon what principles were the first airplanes designed? (Page 267)

10—What would be the advantage of having a great deal of lighter-than-air gas on a plane? (Page 268)

AVIATION FORUM

THIS department is open to readers who wish to have answered questions on Aviation. As far as space will permit, all questions deemed of general interest to our readers will be answered here. And where possible illustrations will be used to answer the question. Queries should be brief and not more than three should be put in any letter. Address all communications to the Editor.

Something About Fuselage Covering

Editor, Aviation Forum

Your announcement of the beginning of a questions and answers department for aviation struck a responsive chord in me. I know it will be very welcome to your readers. However I would be careful to limit the kind of questions to be answered. Many people have peculiar ideas about what to ask, and their questions are of no earthly interest to any but themselves.

If my question falls under that scope, please do not take up your valuable space with it.

What is the usual covering for the fuselage of a plane? What are its advantages? What is meant by streamlining the fuselage? Why is it done?

BENJAMIN KLEIN,
Birmingham, Ala.

(Fuselage frames are covered in order to reduce the air friction over them. Plywood or dural sheets are generally used, sometimes both if the covering is merely to contribute to the reduction of resistance. There are a number of "dopes" (glues) which still further reduce resistance of air over the fuselage. The use of lubricating oil has also been suggested and tried.

By streamlining is meant the shaping of the fuselage (or any other part for that matter) so as to reduce its air friction to the minimum. Certain shapes in passing through the air have a much smaller friction than others, just as a narrow well-shaped prow of a boat will have less friction through the water than one with blunt prow.—*Editor.*)

What is "Retractible Landing Gear?"

Editor, Aviation Forum

Would you please tell me through the columns of your "Aviation Forum" Department what the meaning of the "retractible landing gear is." Also, what is its purpose or purposes, if there are more than one?

WILL FOX,
Montreal, Canada.

(The retractible landing gears are the wheels which can be lifted into a recess in the lower part of the plane provided for it when the plane is in flight. The purpose is to reduce the resistance of the wheels through the air. This, by the way, follows the flight of birds who draw their legs close to their bodies while in flight. Of course on amphibian planes which are designed to land either on sea or water the wheels are drawn up so that they will not be immersed in the water while the plane is floating on its pontoons.—*Editor.*)

What Limits Plane's Speed?

Editor, Aviation Forum

Hugo Gernsback is still on the job finding out what people want before they know they want it. The 'Aviation Forum' idea is certainly a good one and I know it will go over big with your readers. Your magazine certainly looks like a world beater.

Could you tell me through your columns what it is that really limits the speed of a plane? Is it something in the air ordinances or something fundamentally limiting in the airplane idea? Why can't tremendous speeds be developed?

ROSCOE FRANK BLAIR,
Albany, N. Y.

(As a man writing about necessary travel said "It's nothing but a case of more horsepower." The same thing may be applied to the speeds of planes. Given a power plant with sufficient horsepower speeds far beyond anything we have reached are possible. What limits our planes now is just this. Accompanying the increase of speed of a plane there is an increase of air resistance. But the air resistance increases with the square of the speed and therefore the power necessary to send the plane through the air must increase with the square of the speed. Therefore if the speed is doubled the power necessary must be multiplied by four. Multiplying a speed by three means a power plant nine times as powerful. Therefore with power plants limited to the sizes they are—and the power plants are often governed by other structural limits of the plane—the speeds are correspondingly limited.—*Editor.*)

What Are Relative Weights of Parts?

Editor, Aviation Forum:

Relative to your new department on questions and answers on aviation, I would like to know what the relative weights of the various parts of an average airplane are. In other words how much does each part contribute to the total weight? What percentage of the total weight is dead weight and how much is "pay load"? I think that the 'Aviation Forum' idea is a very good one and I know it meets with my own personal approval. I simply can't learn enough about aviation.

ANTHONY DEBRIO,
Bridgeport, Conn.

(As indicated in the diagram shown the total deadweight of the plane is about 63% of the total weight. Of this the structure, fuselage and wings comprise 33% and the power plant 30%. That means that the "pay load" can be about 37% of the total load the plane will carry.—*Editor.*)

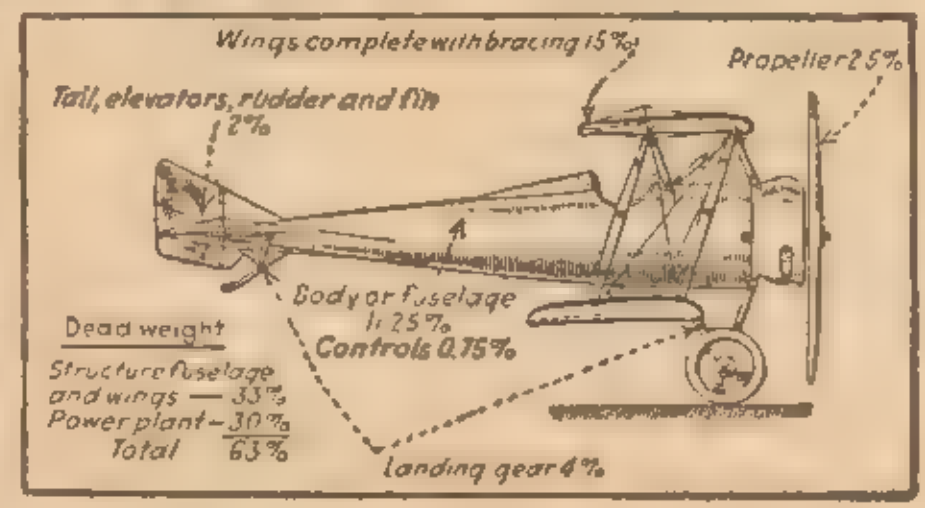


Diagram showing percentages of total weight of plane each part has. (From Page's Aviation Guide" — Lenley.)

How is "Lift" Obtained?

Editor, Aviation Forum

Will you please explain or indicate if you can through your Aviation Forum just how a plane gets its so-called lift? I have been trying to puzzle it out myself and have been unable to. Just what forces are acting on a plane to keep it aloft?

ROBERT STEPHENS,
Detroit, Mich.

(As indicated in the diagram a plane is kept in the air by the pressure of air under its wings due to the speed of the plane. The shape of the wings or aerofoils, as they are called, are such that the air pressure piles up under the wings and causes an area of reduced pressure above the wings. Thus the difference of pressure on the two sides of the wings causes an upward thrust on the wings to balance the weight of the plane.—*Editor.*)

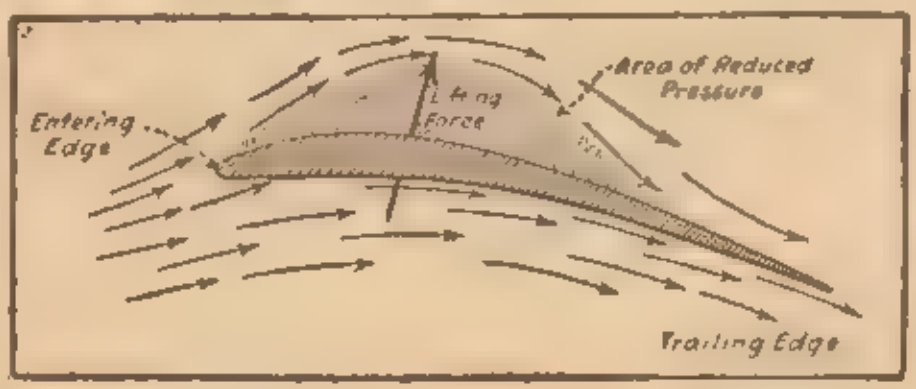


Diagram showing the action of the air pressure on a wing. Note the nature of the lifting force. (From 'Modern Aircraft' — Page.)

What Determines Minimum Flying Speed?

Editor, Aviation Forum:

I was very glad to hear that you have established a department to answer questions on aviation. Such a department should make a valuable addition to a magazine which already, I think, is taking its place among the front rank of periodicals devoted to aviation.

What I should like to know is what determines the minimum flying speed of a plane? Is it the same for all planes?

KELSEY WARREN,
Cleveland, Ohio.

(The minimum flying speed of a plane is determined by the speed necessary to develop a pressure under the wings and a vacuum on top of them to maintain the weight of the plane. Each factor in the problem is dependant on others. That is, given a certain area of wing surface and a certain weight of plane, the amount of upward lift per unit area on the wing surface must, by the area of the wing must equal the weight of the plane. Therefore the minimum flying speed is that necessary to give the necessary wing lift per square inch or square foot. Naturally a light plane with a large wing area will reach a much smaller minimum of flying speed than a heavy plane with a small wing area.—*Editor.*)

What Kinds of Tractive Effort Are There?

Editor, Aviation Forum

What are the kinds of tractive effort that can be given to a plane? That was my question to start off the works of 'Aviation Forum.' Although some may object to having some non-technical material in a publication yet I think the letter as given that was I hoped to illustrate as well as possible how can the reader be pleased if he finds acceptable him with the meaning of the things that are spoken of in between?

I would appreciate an answer to my question in an early issue.

WILLIAM J. FORRESTS,
Boston, Mass.

(The two general types of traction given to a plane are the "tractor" and "pusher." In the first the propeller which by its rotation provides the tractive power pulls the plane by a screw motion of the blades through the air. The "pusher" is the opposite from of the plane. The propeller is in back of the plane and by its motion pushes the plane through the air. Of course there is a third type which is being experimented on and promises well and that is the 'rocket' type by the rapid expansion of highly compressed gases which are driven with tremendous force the reaction of the gases in an opposite direction to it propels the plane.—*Editor.*)

(Continued on page 287)

AVIATION NEWS OF THE MONTH

CONSTRUCTION

Auxiliary Wing to Prevent Stalling

A NEW device to prevent stalling is found in the new [illegible] cruiser TIX, a model of which we have put through its tests lately. The method of preventing stalling, very common sense, is the use of an auxiliary wing just over the nose of the plane. There is also an additional one [illegible] under the nose which will prevent a nose-over when the plane is [illegible]. The plane has a wing spread of sixty feet and is equipped with Wright Whirlwind engines. It is planned to make a non-stop flight to some European field this summer.

German Invents 650-Mile an Hour Plane

IN an interview with the New York *Times*, Herr Perl, a twenty-one year old German, described a new plane, a "flying fish" with which he expects to fly at an altitude of 40,000 feet at speeds reaching 650 miles per hour. On this basis he believes he can fly to New York from Berlin in 6 hours at a fuel cost of only $10. The plane which is 22 feet long and weighs 1,000 pounds has one 85 horsepower motor. The plane is hermetically sealed and a constant pressure is maintained within the cabin. The wings are shaped like those of a flying fish with small stabilizing fins on the tail. The plane will not only be able to fly but also to [illegible] for the landing wheel, etc., will be drawn into the body, thus presenting a fish-like shell to the water. According to Wythe Williams of the *Times*, Albert Einstein as well as Count Arco, president of the Telefunken Company, builders of great radio stations, as well as prominent professors have expressed the belief that Perl has a plane which can reach the high altitude necessary to obtain such great speeds.

New Propeller to Double Plane's Speed

ANOTHER revolutionary invention is that of J. Kalmanson, of Brooklyn, N. Y., who claims, according to the New York *World*, to have invented a propeller which will not only double the speed of a plane but bring a marked saving in fuel. The propeller comes in two parts which may be used singly in front and in back of the plane or both together. It consists of four "airspoons," two on each blade. The front two bring the air to the other two, giving the propellers a greater tractive effect on the air. The inventor also claims that the plane cannot go into an involuntary nose dive with his device and that it can make a landing within a short distance.

New Single-Landing Wheel Amphibian Developed

A NEW plane with a single landing wheel that allows the plane to ride on land like a bicycle and yet land on and take off from the water has been developed and successfully tested by the Grover Loening Company. The landing gear can be quickly lifted or lowered according to whether it is wished to alight on land or on water. The wheel drawn into a little pocket in the main float, which is seventeen feet long and thirty inches wide. A small door opens and closes to receive the wheel or let it out. A lever in the cockpit operates the wheel. The additional weight on the plane is about 80 pounds (a Moth plane being used by the company, equipped with Cirrus Mark II motors) and a reduction in speed of only 4 miles an hour is occasioned.

New Giant Plane Ready Soon

THE world's largest plane, which is being constructed by Dornier in Germany, will be ready within two months according to a wireless to the New York *Times*. It will have twelve 500 horsepower motors and will carry 60 passengers. Its speed will be 155 miles per hour. The length of the plane will be about 150 feet and its wing span 157 feet. The useful load will be 22 tons and the dead weight 38.3 tons.

The motors will be in pairs on the upper side of the wings. This will permit repairs during a flight. The plane is constructed of duralumin.

Liberty Motor Yields to Scientific Advance

THE Liberty motor, the pride of the American air force during the World War, at last yields to the development of motors excelling it and no longer is used in the first line air force, according to a New York *Times* despatch. These motors, which were the result of the pooling of all patents during the war, have served their usefulness, as the recent army maneuvers in Ohio proved them to be 15 miles an hour slower than the new Pratt and Whitney motored bombers. The Liberty motored planes will be relegated to the Army Repair Base at Middletown, Pa., where they will be used in training student pilots.

Scientist Studies Bird Flight

BELIEVING that many of the secrets of airplane design will come from a study of the navigation of birds, Dr. Austin H. Clark, of the Smithsonian Institution, has written a very interesting paper on bird flight, according to the New York *World*. The fact is well known, he says, that large birds have small wings while small birds have large ones and must move them more quickly to maintain their flight. Upward air currents and momentum are what maintain the larger birds. The large birds, however, have more difficulty than the smaller in getting started, and need more open spaces. Soaring on the part of birds is possible only when the sun is shining, so that warm air is rising and they can take advantage of upward air currents. They are thus forced to soar in circles to keep within this column of air.

Fool-Proof Plane Contest Nears Close

THE contest for the best fool-proof plane which the average man or woman can fly, sponsored by the Guggenheim Fund for the Promotion of Aeronautics is nearing a close says Lauren D. Lyman in the New York *Times*. Very few known planes have already been entered in the contest which will award prizes of $150,000 and a great deal of mystery surrounds the actual plans of airplane makers. Believing that the average man or woman will not fly until the "fool-proof" plane has been developed one which does not need any aeronautic expert to safely [illegible] the Guggenheim Fund is making the conditions that planes must fulfill rather exacting. For example one of the conditions states that "the aircraft must show its ability to take off or land on a plot 500 feet square surrounded by a twenty-five foot obstruction." Although the date set for the close of the contest is October 31, only one plane had actually submitted itself at Mitchel Field, Long Island for the tests. This is a Bowers Widgeon I plane built in Brooklyn, N. Y. Several other entries are definitely known but only the one plane has reached the tests stage.

Invents Gravity Conquering Plane (?)

W. D. VERSCHOYLE, of England, claims to have patented a plane which will be free from the influence of gravity and will be able to fly 600 miles per hour. Taking advantage of the theories of Einstein and Sir J. J. Thomson about the nature of gravitation he has constructed on paper his machine to rise or descend vertically. He will control the magnetism, which is the same as gravity, according to the Einstein principle, by the use of electricity. He will thus enable people to travel from the United States to Europe in five hours.

(We are most skeptical about the truth of the above despatch. *Editor.*)

Monster British Airship Acme of Comfort

WITH the finishing touches being made on the monster British airship R-101, those who have been allowed to inspect it declare it to be as luxurious as any first-class hotel, according to a cable to the New York *Times*. The giant dirigible is 724 feet long and will have 5,000,000 cubic feet of hydrogen. It has a dining saloon for 50 persons, a main lounge 60 feet by 20. On each side of the lounge is a seven-foot wide veranda, with band rails. Comfortable settees, club chairs and lounges will allow the passengers to relax, while large windows will allow the views of the scenery below and will permit plenty of sunlight to enter. The exact date of the completion is still unknown.

Multi-Motors Do Not Always Prevent Accidents

THAT the ability of a multi-motored plane to prevent the accident due to stalling of one motor is overrated is the belief of Reginald M. Cleveland in the New York *Times*. He cites the case of a recent Imperial Airways plane falling into the English Channel despite the fact that it was multi-motored. The essential point is, he says, that if one motor or two motors fail the rest must be able to give the plane its minimum flying speed and maneuverability. This is being taken care of in many new planes where 600 horsepower capacity is being taken care of by 900 and 1200 horsepower in motors. Further passenger planes are not being loaded to the limit of their capacity, thus increasing further the margin of safety.

Awarded Damages on Device Navy Used

THE history of a typical attempt to dispose of a revolutionary invention came to light when Rear Admiral Bradley Fiske, retired, was awarded damages of $198,500 from Rear Admiral William A. Moffett, chief of the Bureau of Naval Aeronautics, on his invention of the torpedo plane which the Navy has been using. In 1911, said Admiral Fiske to the New York *Times*, he foresaw the value of the plane and suggested the dropping of torpedoes from them. The Navy Department, he claims, laughed at his idea and finally he developed it himself. He found that the idea was practicable, the only thing necessary was to devise a means of steering the torpedo, once released. This was worked out successfully but still the navy, it was said, refused to accept it. Fiske found later however that the navy was using his device. (In the "Air Terror" in this issue Mr. Morrow has pictured a case so similar that it seems prophetic. *Editor.*)

OPERATION

Flying Boats Will Mark Future Trans-Atlantic Flights

THAT the recent attempts of flyers in seaplanes to fly between Spain and America have proved the worthiness of the flying boat is the belief of C. B. Allen, writing in the New York *World*. The case of Ramon Franco, who was lost in the Azores for ten days and rescued with his machine almost as good as new, is mentioned as one of the strongest arguments for the plane able to alight on the water. The future trans-Atlantic flight by plane will be, in the opinion of Mr. Allen, in a seaplane, making stops at the Azores and possibly Newfoundland, equipped fully with navigators and radio and possessing adequate weather information. Although the single-motored "land plane" will still mark the flights that are done for glory and publicity, the substantial flights for commercial aviation will be in planes equipped for the water.

Flying by Radio Beacons to be Tested

IN a series of tests to be conducted at Mitchel Field, Long Island, an attempt will be made to determine the real value of the radio beacon as a means of guiding a plane on its course. In the tests which are to be conducted by the Guggenheim Foundation, Lieut. James Doolittle, an army flier, will fly [illegible]—unable to see his course from his cockpit. He will be guided only by little lamps set in front of him. The radio beams sent out will cause certain lights to glow if he is off his course on either side and another to glow if he is on his course. A request is being made to the Federal Radio Commission for a wave of 1,014 meters (300 kilocycles) on which to conduct the tests. Pilots who use the radio beacon system are now guided by dots and dashes received audibly through headphones. By the new system it is hoped to do away with them and have only visual signals.

Germans Plan Trans-Atlantic Service

PLANS for the inauguration of regular trans-Atlantic plane service between Germany and Brazil at first, and later between Germany and the United States is the program of Lufthansa, the great German air company. Limited by the short distances to be covered in Central Europe the company is looking toward the trans-Atlantic service as the logical development of their passenger service.

Spain is to be the point of departure from Europe with Brazil as the South American terminus. Trial trips with three Rohrback-Romar flying boats are to begin shortly.

The Zeppelin interests, however, are still trying to establish a definite trans-Atlantic service. In addition to the Zeppelin, they are building a flying boat to be equipped with twelve motors.

When the trans-Atlantic service is started satisfactorily, the Lufthansa hopes to inaugurate a far Eastern line going to Shanghai on the one hand and through Siberia on the other.

Gliding Now Becoming an Art

GLIDING is no longer a matter of jumping from a hillside holding onto a pair of wings and waiting until the initial energy is dissipated before one descends to earth, but has become a new art of taking advantage of air currents, says Major A. D. Ernst in the *Illustrierte Zeitung* (Leipzig). From the first crude efforts of men to remain aloft in a plane without a motor, has come a sport which, in Germany at least, has allowed flights of eight hours. Propelled by a catapult from the top of a hill in the "static" flight, which was the first flight tried, the glider would float down the hillside until it naturally descended to the ground. But in the "dynamic" flight the pilot with an uncanny sense for air currents will face into those currents and have them keep him aloft for many hours.

It has been found that air currents are found flowing up a hillside. If the wind is light it will balance the glider on the way down. Stronger winds will actually lift it, giving it a higher altitude than it started with.

The dynamic effect of various types of countryside are being exploited and a large body of knowledge is being built up about their effects on the glider. Furthermore the construction of the glider is being studied in detail to determine how to reduce weight and give it a greater lifting power.

Autogiro Performs New Feats Says Report

A REPORT from the headquarters of Señor Juan De la Cierva, inventor of the Autogiro, states that he has improved his machine. At a recent test near Madrid he is said to have flown vertically to a height of 200 meters (about 650 feet), despite a strong headwind remained motionless in the air for a minute and then descended vertically with the motor shut off, landing at his chosen spot.

Two More Ship Lines Plan Plane Service

FOLLOWING the announcement that the United States Lines is contemplating a ship-to-shore plane service to cut the trans-Atlantic time for mail by almost a day, there comes the [illegible] of the French Line and the North German Lloyd Line to attempt a similar service if suitable planes can be found. The *Bremen*, the newest ship of the German line, would have a plane meet it six hundred miles at sea and pick up mail and possibly passengers. If this were done also at the European terminus, the water trip would be cut down by one-third. Last year an attempt was made by the French Line to use a plane service for the *Ile de France* but the proper plane was not available.

"Aviation News of the Month"

portrays in plain, yet concise language every important aviation advance during the month. Nowhere can the average reader get such a wealth of accurate and vital information condensed into such a small volume. Some 40 aviation magazines and newspapers are utilized by our editors in the compilation of this department. The publishers welcome short contributions to these pages from the various scientific institutions, laboratories, makers and distributors of planes, etc.

Flying Laws for Intrastate Flying Believed Near

DUE to the complexity of the legal situation regarding licenses for pilots and planes not engaged in interstate flying and therefore not subject to Federal regulation, the making of state laws is believed near. Under the Federal laws all pilots and plane flying across state lines must obtain Federal licenses and submit to Federal inspection of planes. Flyers engaged in only one state, however, have the privilege of obtaining Federal licenses if they wish to obtain the certificates. There are left, therefore, intrastate flyers who do not take the Federal licenses or any other. A state law requiring all flyers to have Federal licenses is one way out of the dilemma while the setting up of the state requirements equivalent to the Federal is another.

Planes Wait for Overdue Trains

ACCORDING to reports of newspapermen invited to make the trial trips over the "Lindbergh Line" air-rail route from Los Angeles to New York, it was the trains that provided the irregularity in schedules, holding up the planes on one occasion for an hour and a half. The route which is 2,852 miles long has 1,913 miles of airway and 939 miles to be covered by rail. But, despite this, the planes have been uniformly on time while trains, principally over the Santa Fe Railroad which goes between Oklahoma and New Mexico, have provided a good deal of irregularity. A correspondent, however, writing in the New York *World*, believes that when winter comes the situation will be reversed and the trainmen may then vent their ire on the pilots forced to buck fog, snow and sleet.

Siberia Within Five Days of New York

THE possibility of reaching the old world by way of Alaska and Siberia was proved recently when a plane made a commercial voyage between Fairbanks, Alaska, and Cape North, Siberia, said Lauren D. Lyman in the New York *Times*. The trip of 2,300 miles both ways was made by Noel Wien of the Wien Alaskan Airways to bring supplies to an isolated trading post and to bring back a load of furs valued at $150,000. The time taken for the trip, plus the record made of a trip from New York to Nome, of four and a half days, placed the Siberian post within five days of New York.

"Crash" Not Always a Crash

THAT some of the undesirable publicity given aviation mishaps is caused by the indiscriminate use of the word "crash" in the newspapers is the opinion of the Boston *Herald*. A crash occurs only when the plane comes down out of control, in which case serious injury can result to the occupants. But many so-called "crashes" in which minor injuries occur are only forced landings. These, says the paper, are on a par with an automobile running onto a curb, and should be given no more publicity. Mentioning the comparative safety of aviation, the paper names Harry M. Jones, of Old Orchard, Maine, who has carried 30,000 passengers in 17 years without a mishap to any.

Houses Insured Against Airplane Crashes

WITH the crashing of an airplane on the summer home of the Governor of New Jersey recently, there has come a demand for insurance by home owners against similar occurrences. For with the growth of air traffic there will come a corresponding increase in the chance of having an airplane suddenly descend on one. The Mayflower Fire and Marine Insurance Company is meeting this demand by issuing policies on homes.

Plane Makes Successful Pickup at Sea

THE first successful pickup and dropping of mail between a plane and a liner at sea was made when a Farnell monoplane using the Adams pickup apparatus dropped a bag of mail on the deck of the *Leviathan* and picked up a bag from the liner without stopping.

The liner had left its pier bound for Europe at 3 p. m. At about six o'clock the plane left Keyport, N. J., and a half hour later had overtaken the liner.

The plane dropped its bag of mail but in the first attempt to make a pickup it failed. Maneuvering back and forth the plane let down a bag at the end of a cable which is to catch in a groove and hold the mail-bag. It caught it this time and simultaneously a catapult threw the mail-bag forward in the direction of the plane's travel so as to reduce the jerk on the bag. A second attempt will be made on the next return trip of the *Leviathan*, this time when the ship is still 350 miles at sea.

Lights and Sounds Indicate Altitude on Planes

BY a recent development of Dr. E. F. W. Alexanderson, of the General Electric Company, pilots can now have a positive indication of their height above the ground even though the weather may be so bad that they cannot see the ground.

The device consists of sending a radio impulse to the ground from the plane and picking up the same impulse after it is reflected from the ground back to the plane. The sound is picked up as a squeal. Whenever the airplane changes altitude by half a wavelength, a whistling note goes through a complete tone cycle. By counting the cycles of the tone it is possible to measure the altitude. A meter reading from 200 to 3000 feet gives the pilot an opportunity to know accurately his altitude within these limits. As the plane approaches the ground the echoes become stronger. A memory reader is connected with the meter by which the meter continues to hold the altitude reading and give off the same echo until the altitude is changed. Connected with the device (in a manner not explained) are colored lights. A green light flashing on indicates that the pilot is 250 feet above the ground while a yellow indicates 100 feet and a red light shows an altitude of 50 feet.

(Continued from page 280)

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THE READER AIRS HIS VIEWS

IN this department we shall publish every month your opinions. After all, this is your magazine and it is edited for you. If we fall down on the choice of our stories, or if the editorial board slips up occasionally, it is up to you to voice your opinion. It makes no difference whether your letter is complimentary, critical, or whether it contains a good old-fashioned brickbat.

All of your letters, as much as space will allow, will be published here for the benefit of all. Due to the large influx of mail, no communications to this department are answered individually unless 25c in stamps to cover time and postage is remitted.

A Pilot Speaks His Mind

Editor AIR WONDER STORIES:

Hark, Mr. Editor man, to the squawks, squeaks and squeals of a pilot!

For a couple of years, more or less, I've followed your editorial endeavors with great satisfaction. When I saw a notice in the paper that you were to edit an air story annex, however, I became concerned that you'd stepped a cog at last. Well, you've raised that question what will you do but leave present-day flying alone and stick to your own sphere? Just as you are and will always be—and wise enough to know it, too!

With a copy of your first AIR WONDER STORIES before me, I can find only the following faults:

1. In your "Aviation News" department, you speak of a helicopter, and explain that it is a bird-like airplane. In the first place the helicopter is no airplane at all, merely another type of heavier-than-air aircraft. In the second place its lift is derived from rotation of a set of two or more airfoils in the manner of a propeller with vertical thrust. I might say here that the helicopter is much farther from true flight than the airplane, inasmuch as the latter does soar while the former does not. The true bird-like craft is known as the ornithopter, deriving both lift and propulsion from the horizontal plane by flapping its wings. The objection is of course the complicated movements necessary in these members. I don't recall an instance of any ornithopter's success. The helicopter has, however, been built and flown, experimentally though I cannot believe in its commercial practicability, because motor failure must certainly result in a bad crash there being no wings to allow it to glide down in safety.

2. In the same department, you have an article headed "Tail Spin Causes Most Crashes." I am not really sure but believe that this *should* be most *fatal* crashes. I've had three friends "crash in," so far—two in spins (or the beginnings of them) and one otherwise—also one to "spin in" and write off a ship without serious physical injury. On the other hand, in the past thirty days alone (the three above cover two years or more—none in this thirty-day period) I've known six ships to crash because of motor trouble alone. These, however, did not result in any injury to passengers or pilots in any way save of the old horsehide pocketbook. The losses there ran from forty per cent. of the plane's value to one complete washout.

3. Same department, heading "Safety Slot Keeps Planes Stabilised." So far so good. But when you call it a safety device from the standpoint of stability, I want to find out. What is a stall? A ship is "stalled" when the wings no longer take sufficient effect to hold the ship in the air and the controls don't get enough "traction" so to speak to hold her steady. And a very disagreeable sensation it is, I assure you, especially when one is close to the real estate. Now at this point the slotted wing takes effect. "Like a guardian angel" (as its exponents tell us) it rises from its position in the leading edge (due to lowering of pressure on the top) and projects a smooth stream of air over the foil. This again seals the partial vacuum on the top of the airfoil (where about 70 per cent. of the lift occurs) and also on the ailerons. But what of the tail-group—the controls that "save the day?" They, my friend, must grow very loose and flabby. And when the speed gets too low for the slot—what? If the ship flies okay—how is your inexperienced pilot, that this slot was to save, to know when he's in trouble? I don't know, but I imagine that when one of these "souped-up" ships spins it must be a man-sized job to get going again! This, of course, being due to lack of extra pressure on the rudder—which is about the only thing that helps when she goes to wing up.

Incidentally, I believe in the slotted wing because of the safety it gives when one must land in a cotton-patch about the size of his ship plus ten feet. If the above objections can be answered I'd appreciate some expert's doing so. Unlike most pilots of my class, I did not fly in the war, and I *don't* know all there is to the business. In fact, I freely admit that I have only something over eighty hours, and have recently finished a "Limited Commercial" flight test. Knowledge—really reliable information on the slotted wing is not very plentiful just now, and I certainly am not "broken out" with it.

4. I enjoyed "Islands in the Air" by Mr. Morrow very much—but can't really see the advantage of those same islands. Personally I've always had a mania for nice sand air to land on. Our Colonel Lindbergh had him a scrape some not so long ago, at Mexico City or that vicinity, on this account. He lost a wheel, in taking off. Now, here on sunny Texas (altitude at Dallas 500 feet) his job would have landed at some 45 or 50 miles per hour. My money says a little of his dexterous manipulation (practically a jackknifed 'ground loop') would have put her down without further damage. But *there*—at about 8,000 feet *that* is another story! My guess is that he came in at about 85 or 90—maybe even more. Result? Well, nobody was hurt much due to his usual coolness and attention to detail, but he didn't fly that ship again soon! All of which is somewhat beside the question. The idea is though that the good effect of the slotted wing mentioned above would be just about be nullified by the necessity of landing at an altitude of a few thousand feet!

But to have done with my hair-splitting and et ceteras I want to say that to my mind, your new magazine is a grand success. It doesn't aspire to tell of the brave deeds and dauntless courage (rarely done or possessed) by the present day "mail twisters" and "Jenny herders" like myself, usually making itself ridiculous and bolstering weak plots with weaker side issues that give us a name like traveling salesmen—but goes into the future, giving us some mighty fine reading and who knows how many bright ideas.

Keep up the good work—and don't mind my kicking a little. I kick my chum regularly once a week and tell him he's a bounder, a bum, a cad—a derelict on the sea of life and no earthly use to anyone. I think he gets mad at me—and takes it out on his work. I'm not speaking of any one story, in the way of praise—because the blamed things are *all* too good for me to say which I like best!

C. T. GREDING
Hangar No. 6, Love Field
Dallas, Texas.

(We are very glad to get such a critical and well thought out letter from an experienced pilot. Getting the "Aviation News" from the various papers and journals devoted to the art, we do not question the technical efficiency of the devices written about. Rather we allow, as in this case our readers to frankly state their opinions on them. Regarding the Handley-Page safety slot, we believe that the company frankly admitted that the use of it reduced somewhat the pilot's ability to maneuver the plane. But the British Government thought so well of it that they bought it for no less than $500,000. Anyway, we found Mr. Greding's letter a very interesting one and invite him to send us another when the mood strikes him. However, there may be some pilots among our readers who do not agree with Mr. Greding. Our columns are open to them.—*Editor.*)

Likes the Whole Blame Magazine

Editor AIR WONDER STORIES:

Having been an ardent reader of SCIENCE WONDER STORIES when the latter's sister magazine, AIR WONDER STORIES, was announced, I awaited its advent with a good deal of pleasure. Seeing it on the newsstands, I purchased it and it comes, in all ways, up to my expectations. It is much like its sister magazine.

I liked the cover. I did not have to refer to the Table of Contents to see what the story was that it illustrated. The symbol of a propeller was also very appropriate. And there is no one like Hugo Gernsback to write interesting editorials!

And now for the stories. I had read "The Ark of the Covenant" before, and have tried to reread it, but had not succeeded until it appeared in AIR WONDER STORIES. It is a darn good story. "Islands in the Air" was also good. The cover design made me suspect that it was a lot of things but it wasn't! "The Beacon of Airport Seven" had me all mixed up and I still don't know why the wherefore was which! However, it was told in a excellent manner. I like the "Inside Info" on War, especially as it was by Lester Del Rey. "Men With Wings" was splendid. All had to be Jules Stone. *By the way how old is he?* He didn't look very old in the photo. I'm going to send for those "Six Scientific Questioners" as soon as possible. I like the idea of a Science Library. In fact I have one already. The "War in the Air" heads stamp-punch of yours. The "Aviation News" was too technical for me, but I liked it being there, even though I didn't read it. And that's about all. I like the cover. I like the binding. (The paper could be better.) I like the whole blame magazine. And I want to say, if you don't stop putting out so many magazines I'll go broke, for I always buy them! Here's hoping the best! Yours for a bigger and better AIR WONDER STORIES!

HENRY KUTTNER, JR.
San Francisco, Calif.

(The editor has a compliment. Mr. Kuttner's letter is another one of those with nothing but praise for AIR WONDER STORIES. The readers has better beware. There is nothing more fatal to the editorial cranium than an excessive swelling induced by a surfeit of praise.

Leslie Stone, author of "Men With Wings," we wish to state, is not a he but a she. And mash on as he is a young and comely she. Mr. Kuttner's error is natural.

The point in the "Beacon of Airport Seven" was that he guessed that the light rays from the beacon were that the beacon light really appeared to come from a place other than its real source. The pilots, of course, not knowing this, would either misjudge their height above the ground or their latitude or longitude and would either crash into the ground or go far off their course. This story by the way is one of the best of its kind that we've read. *Editor.*)

Finds Two Mistakes

Editor AIR WONDER STORIES:

I have just finished reading your first issue of AIR WONDER STORIES and have enjoyed it more than any other of your publications. Yes. Your other magazines were good, but this magazine seems a little better.

I like the idea of putting in the "Aviation News of the Month."

Paul's drawings are very good, but on the cover where he pictures the "Islands of the Air" there seems to be two mistakes. One is that the shadow of the tower on the island nearest the [illegible] falls in a different direction than any of the others.

The other is that the thing on the island that shows which way the wind is blowing (so that airplanes know from which direction to land) is pointing in the opposite direction of that in which the smoke is going down on the ground.

I want to thank you for the enjoyment you have given me and I hope every issue will be as good as your first.

ARTHUR KAUPER
Wapakoneta, Ohio.

(The editor cheerfully admits the justice of Mr. Kauper's criticism of the two errors on the cover design for the first issue of AIR WONDER STORIES. As Mr. Kauper, we understand, is only 16, we must congratulate him on his keenness of perception as well as concentration on the details of the drawing. We are always happy to receive such criticisms. In fact the editor is becoming worried about his mental state. The letters received are almost uniformly filled with words of congratulation and praise. He often sighs on finishing a letter to find not a bit of criticism, no old-fashioned "brick-bat" that stirs him so.—*Editor.*)

(*Continued on page 280*)

AVIATION NEWS

(Continued from Page 277)

Dirigibe for Meteorological Study

EXACT studies of meteorological conditions as well as certain radio effects will be afforded the Massachusetts Institute of Technology by the loan of the dirigible *Mayflower* for the Institute's summer observation station at [illegible] Mass. [illegible] of Zeppelin Corporation [illegible] will take place by having the ship remain above the antennas and measure the energy radiated from the station. There will be [illegible] and general weather studies impossible on the ground or [illegible] inability of [illegible] Eventually it is hoped [illegible] can be [illegible] broadcast.

Diesel Engine Looks Good, Says Curtiss Executive

C. M. KEYS, president of the Curtiss Aeroplane and Motor Company, sees interesting possibilities in the Diesel motor for aircraft and his company is continuing [illegible] experiments of the last few years on it. With a [illegible] engine and affording better operation of the plane's radio the Diesel engine according to Mr. Keys sees definite advantages. The lowered cost of fuel, which the Diesel engine also shows, is not believed by Mr. Keys to be important as he says the fuel cost on one line, the transcontinental Air Transport is only 2½ cents a mile where as the total cost of operation is 50 cents a mile. Other aircraft executives disagree with Mr. Keys, however, and do not believe the Diesel promises much.

Steam Turbines Proposed for Large Planes

BECAUSE of the prohibitive weight of gasoline engines when used for planes having a great power, the possibility of using the steam turbine has been opened, according to Ljungstrom Steam Turbine Company of Stockholm. They are now preparing specification for an American plane which will have a power of 2,[illegible] to 10,000 horsepower. There would be a high pressure boiler fed with crude oil, the boiler to supply steam for two turbines. A turbine weight as low as two pounds per horsepower has been reached. The use of this method would permit of lower [illegible] The steam [illegible] would be exposed large cooling surfaces on the wings of the plane for condensation. Although the weight of fuel would be greater than on the gasoline engine the cost would be less.

"Unsafe" Plane Has Perfect Safety Record

SIX years ago the HS2L type Navy flying boat was branded as being unsafe and Navy fliers were warned not to "stunt" in it. They were to be used only on the routine cruising and patrolling work. Whether because of this or in spite of it, a recent tabulation of the record of that type of craft shows 30,000 flying hours covering 2,000,000 miles without a single fatality. Aviation experts reviewing a recent wave of fatal plane accidents have been forced to come to the conclusion that "safe" planes promote recklessness on the part of pilots and hence accidents, while the dangerous plane is so carefully handled that it becomes "safe."

Twenty Miles an Hour Added to Army Planes

THE use of a chemical to cool the Curtiss Hawk airplane engines used by the army as pursuit planes has increased the speed of [illegible] boat saving in weight and afforded great increase in the speed of ships according to Brig. General William A. Gilmore. The ships need a much smaller radiator surface and thus the "wing-skin" radiator has been used with a great reduction in the parasitic resistance. There has also been a great saving in weight as little water is needed, and thus more military equipment can be carried or more say fuel if the ship is [illegible] The climb [illegible] men. (Could us these [illegible] previously. *Editor*)

THE READER SPEAKS

(Continued from Page 279)

Lunch Hour Discussions

Editor AIR WONDER STORIES:

Although just out of my sophomore year at high school, I thought it might interest you to know what an effect and reaction boys and girls of my age have to your magazines.

At present, I am going to the telegraph school at Western Union and have found, to my immense pleasure, that fully 50 per cent. of the students read your magazines, and have read the one you edited formerly, before you started SCIENCE and AIR WONDER STORIES magazines. In each case, they have the opinion that your magazines are a 100 per cent. improvement over the old.

During lunch we have very interesting and animated discussions over the different features of the stories and often very ingenious and plausible theories are advanced in regards to future events and to explain some things we do not understand.

Last fall I entered high school two months late, and signed up physics as one of my subjects. Having lost nearly one-quarter of the school year, it ordinarily would have been very difficult for me to catch up, but because I have read your editorials since I was about 12 years old, I had no difficulty in taking up physics at that time and catching up with my work. All this because of the scientific knowledge I had absorbed.

"The Alien Intelligence" was a wonderful story. Let's have more like it.

"The Radium Pool" bids fair to be a classic second only to "The Moon Pool."

"The Moon Beast" is rather far-fetched.

I haven't finished "The Feminine Metamorphosis" yet, so will withhold my opinion.

"The Eternal Man" is good but let's have a secret ending of the poor professor.

I [illegible] AIR WONDER STORIES, Miss Weird Wings' [illegible] writer with [illegible] the Air" a [illegible] would [illegible] yet almost [illegible] the Ark of the Covenant."

Your "Science" and "Aviation News" departments alone are worth the price of the magazines.

Let's have more stories by Leslie Stone and the writer of "The Visitation," and how about another cover contest.

By the way, there has been quite an argument about Leslie Stone. Some contend it is a girl; others, *it* is a boy. At any rate I bet Leslie is rather young. Please give us all the information you can, address, age and sex. Personally, I think *it* is a boy, and about 15 or 16 years old from the picture.

Here's to greater and better SCIENCE WONDER STORIES and AIR WONDER STORIES.

FRED PETERSEN,
Salt Lake City, Utah.

(Leslie Stone is a young woman of, we should judge, twenty-two. We are glad to get the insight into the effect of our stories on our readers. The description of Mr. Petersen helps to fill in the background of the glimpse we are trying to get of our reader group.—*Editor.*)

Wants Sequel to "Planet's Air Master"

Editor AIR WONDER STORIES:

Congratulations—you've made another hit. I have just finished reading your second issue of the AIR WONDER STORIES, and it's almost as good as its sister magazine. I am an ardent reader of both.

Let [illegible] say a word or two about that incomparable story "The Ark of the Covenant." In my opinion it is the best air story you will ever publish in your magazine. I am reading it over for the fourth time and I still get that same old kick from it.

Another story I thought was very good was "Beyond Gravity," by Ed Earl Repp. Give us some more from him. "The Planet's Air Master" was another one that made your blood [illegible] as you read it. Let's hope the author gave us a sequel. I really think one is due.

There is one story I didn't like. It was "Islands in the Air." The science was good but the plot was that same old thing where the villain comes back and steals the plans of the [illegible]. Now, let's see us any more of that stuff. That is one thing I liked about "The Ark of the Covenant." There was no sneaking villain to steal the plans of the new airship, the *Merlin*.

I think one of the best things about your magazine is the wonderful illustrations my Mr. Paul. He is, without question, the best artist that you could secure for that type of work. I admit that some of Paul's earlymen are not quite perfect but when it comes to drawing men from other planets and huge fantastic drawings of machinery and laboratories, Paul has them all "skinned" a mile. I think one or two more illustrations wouldn't hurt the magazine.

One more brickbat and I'll sign off. Please, for gosh's sake, print on a better [illegible] I [illegible] the [illegible] but it will reduce [illegible] size.

The [illegible] of [illegible] the author's portrait along with his story is a good one. Keep it up.

DICK PITTS,
Charlotte, N. C.

(As if made to order a sequel to "The Planet's Air Master," by Edward E. Chappelow, is already in our hands. We [illegible] it is better than the original story. It will probably appear in the November issue. We are surprised that Mr. Pitts did not like "Islands in the Air" as we considered it a very good story. Although it may seem a version of the old "villain" theme, still the facts of our every [illegible] life show that Mr. Morrow has not overstated the case. As we are reading a life of Alexander Graham Bell, we will appreciate how true many [illegible] are now [illegible] of their inventions by such men as Mr. Morrow describes.—*Editor.*)

Wants Humorous Aviation Story

Editor AIR WONDER STORIES:

I have recently [illegible] copies of AIR WONDER STORIES [illegible] which were very good. I would like to know whether you are going to have a quarterly or annual. In the August issue "The Silent Destroyer" was very good but a little too short. "The Ark of the Covenant" was also very good. I agree with Albert Taylor in that you ought to have a humorous aviation story once in a while. I would like to know what a kilometer and a kilo are in American measure.

DAVID OXSTEIN,
Chicago, Ill.

(We feel a little proud in being able to fill our readers' needs almost as they [illegible] "Suitcase Airplanes" is an [illegible] story [illegible] writer of fine ability. We cannot yet divulge his name. But his story will appear shortly. A kilometer is about five-eighths of our mile, a kilo (gram) is 2.3 pounds.—*Editor.*)

Questions Nordic Superiority

Editor AIR WONDER STORIES:

I have just finished the story "Men With Wings" and have come to the conclusion that as a writer I see the stars. Lee Stone will make a good school teacher. The story was almost improbable. In the first place you know that every invention or scientific theory is based on something that has gone before. How is it possible that 400 years ago a man did such wonderful things as a gland [illegible] especially from a bird? Where would be place this gland as there is no place in the human body that could use a gland that was absolutely [illegible]. Next [illegible] will [illegible] perfect the [illegible] and then as it [illegible] to [illegible] will broaden considerably, and they would gradually develop into birds. If men ever do develop wings they will be more like the wings of bats, stretching from the hands to the feet. Men will have to undergo great body changes if this were to come about. I don't see how this would [illegible], as [illegible] your [illegible] here or [illegible] ever she said (the language was entirely too flowery). It would seem like every day [illegible] to be person with wings.

Next I am [illegible] and color and [illegible] I'd be called a Nordic or [illegible] Swedes are [illegible] as the [illegible] and [illegible] of northern and [illegible] blood, and I [illegible] call it all. [illegible] you realize what a [illegible] [illegible] has a real [illegible] are a [illegible] Nor is there [illegible] as race superiority as where one [illegible] was the [illegible] New York [illegible] nice to say. Every story except "Men With Wings" was good and I wish you good luck on your new publications.

L. BROWN,
Minneapolis, Minn.

(Mr. Brown's idea about "Men With Wings" is well taken. There would undoubtedly have to be a "seat" for the wings to grow. But what Mentor did was to hasten the evolution that might have taken thousands of years. All qualities are transmitted through the blood and what Mentor did was to instill those qualities and allow them to develop through the generations.

We feel [illegible] that race superiority is not altogether well founded. Races [illegible] or flourish, depending on a great many factors, one of which is psychological.—*Editor.*)

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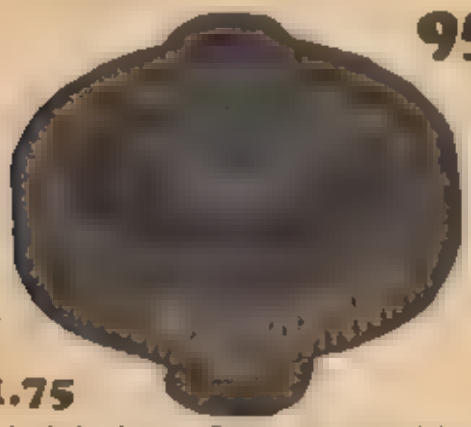

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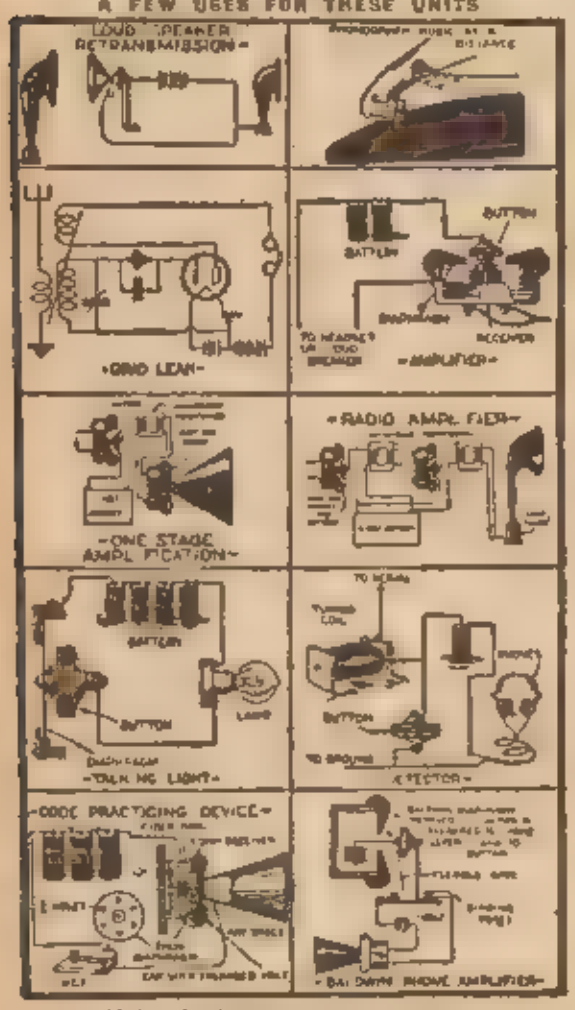

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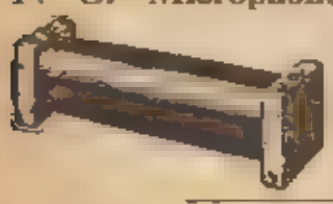

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THE READER AIRS HIS VIEWS

(Continued from page 280)

Does Not Favor Aviation Forum

Editor AIR WONDER STORIES:

The brick-bats in this letter will be like those in the letter I wrote to SCIENCE WONDER STORIES.

You have published a notice that, beginning with next issue, you will start a new department called "Aviation Forum," in which questions and answers will be published.

I for one, am not in favor of this new department. AIR WONDER STORIES should be purely a fiction magazine.

Such departments as the new one and "Aviation News of the Month" will spoil it. What you publish in "Aviation News of the Month" is not the latest news. The latest news can be obtained in any of the aviation or scientific magazines on the newsstands.

The second part of "The Ark of the Covenant," by Victor MacClure, is even better than the first.

"The Planet's Air Master," by Edward E. Chappelow, took second place and "The Silent Destroyer," by Henrick Dahl Juve, third.

The cover picture was the best yet.

JACK DARROW,
Chicago, Ill.

(We are happy to get frank expressions of opinion on the policy of AIR WONDER STORIES such as are contained in this letter. After all, we can only get an index of our readers' desires through such expressions. We invite our readers to give us their opinions on this subject.—*Editor.*)

From One of Our Authors

Editor AIR WONDER STORIES:

Thank you for the copies of each of your magazines which you have recently sent me. I have subscribed for AIR WONDER STORIES which I was surprised to find not too different from SCIENCE WONDER STORIES.

In view of the enormous interest in aviation the magazine should enjoy a good circulation and attract many new writers, and I feel that it will do so. Personally, though, the scope is narrower and more limited as well as more technical, and for these reasons does not interest me quite so much as a basis for my writing. I have enjoyed the apparent limitlessness of the theme-possibilities for general stories. It offers unique opportunities for originality. This may be with a feminine point of view for generally speaking, I think more people are interested in the future of aviation than they are in a diversity of scientific possibilities. It is probably a matter of taste, and with your two excellent magazines you will attract both.

(MRS.) CLARE W. HARRIS,
Lakewood, Ohio.

(We print this letter from Mrs. Harris, one of our good science-fiction authors, to indicate her opinion, a correct one, of the general interest in the future of aviation. We still hope, for the sake of our readers, to induce Mrs. Harris to contribute to AIR WONDER STORIES.—*Editor.*)

Will Revolutionize Air Story Field

Editor AIR WONDER STORIES

After reading your first edition I can assure you that it made a great hit with me as well as with all my friends who have joined me in reading this wonderful magazine which I believe *will revolutionize the entire air story field.*

Having been keenly interested in the rapid progress of aviation in the past I can readily see the possibilities and viewpoints which your authors have. This is especially true in "The Bloodless War" by David H. Keller. I acknowledge that future wars will be fought exactly this way or in ways similar to it. But it certainly is true that we will have radical contests in the near future. Let's have more of Dr. Keller's stories.

"The Ark of the Covenant" by Victor MacClure was a wonderful story, though in my opinion a bit far-fetched as far as completely stopping all transportation as well as putting its victims in a coma is concerned. I think he has carried it a bit too far. Of course I have read only the first installment and there is probably some big surprises in store for me in next month's installment.

MYRL DRISCOL,
Grand Rapids, Mich.

(We can agree heartily with Mr. Driscol on the forcefulness of Dr. Keller's presentation of a possible war to be fought from the air. General Mitchel, formerly commander of our air forces, has shown convincingly that the airplane in the next war will be the most powerful weapon of offense, and because it can descend on an enemy practically without warning, will constitute a most terrible weapon. There is

(Continued on page 282)

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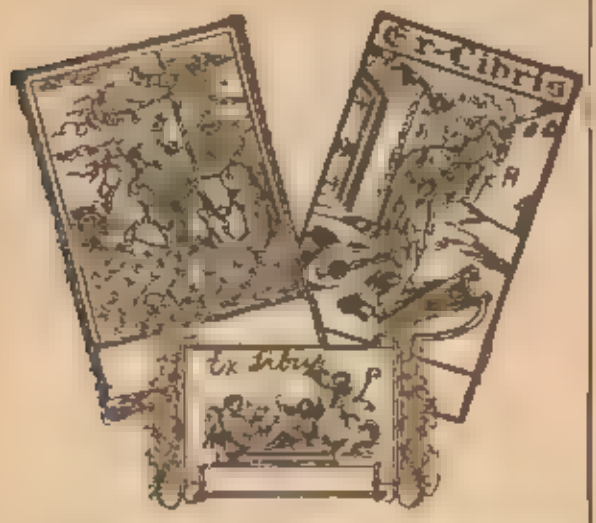

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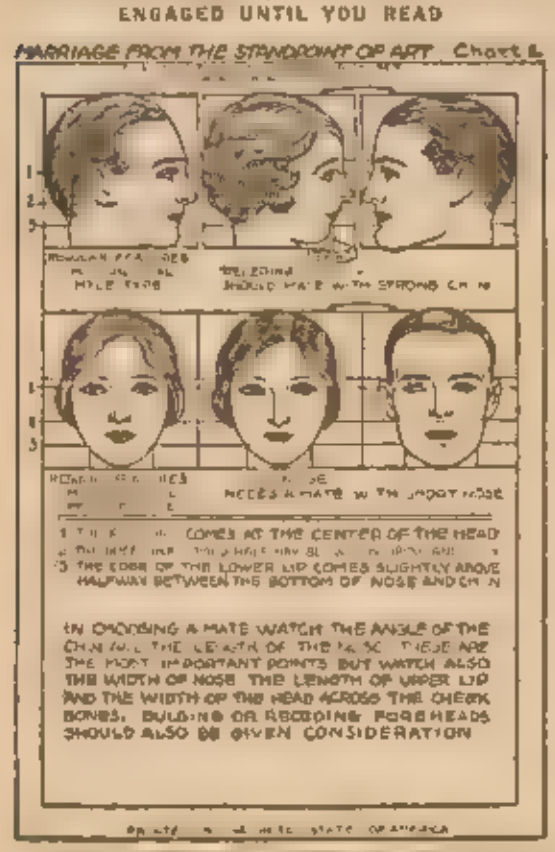
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98 Park Place New York, N. Y.

THE READER AIRS HIS VIEWS

(Continued from page 281)

little doubt that the next war will be won from the air, and probably with a suddenness that will stagger the defeated.

By this time Mr. Driscol will probably have read the second and third installments of "The Ark of the Covenant" and he will have perceived that the power given to the raiders is not a bit far-fetched. The [illegible] are so possible of realization that a [illegible] not adequately protected from the enemies within its borders, as well as from those from without, may well tremble.—*Editor.*)

Cites Peril of Foreign Domination

Editor AIR WONDER STORIES:

I have just recently finished reading your AIR WONDER STORIES, and I am writing this to congratulate you upon this splendid piece of work.

I no sooner had finished it than it was borrowed and from that time it has gone the rounds. I am unable to say or guess how many persons eagerly perused this remarkable [illegible].

Besides myself, a number have intimated to me that "The Ark of the Covenant" promises to be one of the best stories they have ever read. As you said editorially, the author, Victor MacClure is a past master at the art of writing, as I have seen few stories which in my opinion have approximated this story in suspense, interest, style, and literary [illegible].

"Islands in the Air," "The [illegible] Air port Seven," and "Men With Wings," are every one most excellent stories, hard to beat.

I especially want to commend Dr Keller's "The Bloodless War." This graphically brings home our imminent peril of foreign domination To a great extent, the next war will be fought in the air and William D. Mitchell has conclusively proved that the United States is absolutely unable to defend itself in the air. In "The Bloodless War," Dr. Keller shows what will soon happen to us unless we snap out of it.

Yes sir, I reiterate. You have produced a fine magazine, and, as several have said, it bids fair to lead SCIENCE WONDER STORIES in popular esteem. How about an AIR WONDER "Quarterly?"

WALLACE C. WARDNER,
Hobart, Okla.

(This letter of Mr. Wardner is another of the flood of letters of congratulation that has reached the editor. As we have indicated on Mr. Driscol's letter, the nation that controls the air may well control the world. An enlightened public opinion, with a full knowledge of the facts, is what is needed. One cannot afford to look backward to 1914 or 1918 for a glimpse of what future warfare will be like.

An announcement regarding the possibility of an AIR WONDER Quarterly will probably be made in the near future

No interplanetarian stories are contemplated at present for AIR WONDER STORIES. It is believed by the editor that AIR WONDER STORIES should concern itself with terrestrial aviation alone, for that field really embraces a wide and thrilling field of play for the imagination of writer and reader alike. However we cordially invite the [illegible] on the editorial policy of AIR WONDER STORIES. We must please our readers.—*Editor.*)

Wants Two More Magazines

Editor AIR WONDER STORIES:

I have just read your latest magazine, AIR WONDER STORIES, and find it excellent. I must also congratulate you on getting Frank R. Paul as your art director. I think most of his drawings are superb. "Islands in the Air" was the best story I think. Next to it I would rank the story "The Bloodless War." I did not like your first [illegible] of the Ark of the [illegible] by Victor MacClure. I have [illegible] Mr. Gernsback through his career and I think that he is [illegible] of putting two more great science fiction magazines on the market.

I wish you could persuade Mr. Schlossel to write a sequel to his story which appeared in your former magazine. "The Second Swastika" was the title of it. I have read nothing to equal this, or do I think I ever will, if Mr. Schlossel does not give us a sequel

RICHARD M. SCAMMON,
Minneapolis, Minn.

(We are not sure whether we understand Mr. Scammon aright when he says we are capable of putting out two more science-fiction magazines. Does he mean two in addition to AIR WONDER STORIES and SCIENCE WONDER STORIES. If so we feel mightily encouraged by it. Tell us truly, Mr. Scammon, did you really mean two more?—*Editor.*)

Waiting for the Next Issue

Editor AIR WONDER STORIES.

I recently purchased a copy, I should say the first copy, of AIR WONDER STORIES. I have read it from cover to cover, and enjoyed it immensely. The only thing I can find against it, is that I won't know what to do until the next issue comes out.

I like the [illegible] on the first page of every [illegible] very much. Keep it up. [illegible] by Leslie Stone. Her "Men With Wings" was fine. Victor MacClure's new serial sure keeps you in expectation. L. H. Morrow and H. S. Sykes are also very good. David H Keller is fairly good, but for goodness sake don't overwork him.

I found many interesting items in "Aviation News." If you keep up the good work, I don't think I will ever have any complaint.

CHARLES DIETERLY,
Cincinnati, Ohio.

(Somehow the editor has an impish desire to do something that will cause a complaint. It just isn't right that we should not receive some. Hardened and matured as we are to "brick-bats," like the "Krazy Kat" of well-known associations, we are rather lonesome without them. However we are ever appreciative of the good things that are said about us.—*Editor.*)

Have There Been Winged Men?

Editor AIR WONDER STORIES:

I want to compliment you on your new magazine, as there is some very fine science in it and makes very good reading matter. Your "Men With Wings," by Leslie Stone, in the July issue, was certainly a wonderful story and furnishes very good food for thought

I am a reader of your former magazines. I am only twelve and of course have [illegible] limited knowledge of science, but I [illegible] stories and am very [illegible] was [illegible] clever how [illegible] "Men With Wings" [illegible] Do you actually think that? I suppose not. I was just wondering.

[illegible]
Amesbury, Mass.

(As far as our knowledge goes there has never been an experiment with [illegible] stories of men wearing artificial wings [illegible] flying through the air. So we are not sure that [illegible] Perhaps some day we will [illegible] stories of men wearing artificial wings and flying through the air. So we are not sure that [illegible] Perhaps some day we will [illegible] Daedalus and Icarus, who lived in Crete, made wings of feathers and wax and flew across the Aegean Sea. But Icarus, wishing to fly nearer the sun than his father dared, rose high into the air. But the sun melted the wax that held the wings on his shoulders and he fell into the sea.

Some day when we at Mr. Stone prophesied we may see men with [illegible] or there will be [illegible] but he can remove when and as he wishes. This sadly wings that he is forced to wear [illegible] time might [illegible] to something [illegible] to him. But there is no reason why something pictured for example in "Flight in 1999" in this issue, should not come to pass. As Bruce Gould so truly says in his new book, "Skylarking," (reviewed in this issue) the desire of man to fly has always been with him as a deep-seated spiritual need. The picture of people standing with arms outstretched toward the sky is a real and vivid one. Perhaps in ages long gone by man once had wings. And even though millions of years have passed, being chained to the earth has never satisfied him. However [illegible] has trickled that stream [illegible] Being realists [illegible] what [illegible] is [illegible] that [illegible] only [illegible] but it has much to sustain it.—*Editor.*)

From An Associate Editor

Editor AIR WONDER STORIES:

I have received your magazine and am tremendously interested in the stories. I have one boy of sixteen years of age and when SCIENCE WONDER STORIES and AIR WONDER STORIES come, about a dozen boys of the neighborhood gather in. And such interest I have never seen.

So far as I have been able to judge in my own [illegible] of [illegible] I think your magazines are great. If you desire I will write more fully about them when I can find time.

With the very best wishes.

PROF ELMER G. CAMPBELL,
Transylvania College, Lexington, Ky

(This letter from one of the associate editors of SCIENCE WONDER STORIES gives us a justifiable feeling of pride. That this scholar and scientist finds SCIENCE WONDER STORIES and AIR WONDER STORIES such good reading for his son only confirms us in the belief that we are doing our job well. Our job is that of entertaining and instructing thousands of young and mature, eager, questioning minds.

We would certainly be delighted to have from Professor Campbell as vigorous a criticism of our magazines as he can give. We are sure that his words will be well worth listening to.—*Editor.*)

(Continued on page 283)

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THE READER AIRS HIS VIEWS

(Continued from page 282)

Try to Keep Him From It!

Editor AIR WONDER STORIES:

I was able to get one of your magazines this evening and read it straight through.

It is more than great. I don't know what to call it. I have read most of your others but this is the best—both in fiction reading and all other departments.

I cannot send a subscription now but I certainly am going to get your next issue as soon as it appears. Try and keep me from it.

ERNEST H. LUGNER,
Chicago, Ill.

(Sighing, we hereby pass on to our readers another of the, it seems, numberless letters of praise on AIR WONDER STORIES. What can we say, burdened down with such good words? —*Editor.*)

Catches Father Reading "Ark of the Covenant"

Editor AIR WONDER STORIES:

Until you began the publication of SCIENCE WONDER STORIES and AIR WONDER STORIES I wondered if the Master of Our Minds was deserting his chosen field? Quite suddenly through the medium of Mr. Paul's original, delightfully untamed skill, I found you again. The discovery immediately cost me fifty cents.

Of all the science-fiction issues I have read the August issue of AIR WONDER STORIES surpasses all for pure and complete enjoyment.

"The Ark of the Covenant," "Beyond Gravity" and "The Planet's Air Master" etc., all were splendid. After several fairly successful attempt to interest my father I caught him reading "The Ark of the Covenant" voluntarily.

I believe that one should set for himself an unattainable (as yet) goal and work hard towards it and great things will be done. In other words one should read "our" magazines for ideas.

You and your staff are unhesitating pioneers in glorious science, you have lifted science fiction from trash to perfection and some day, I hope to, universal esteem. May the years only augment your efforts in advancing the work that Jules Verne, H. G. Wells and E. R. Burroughs so ably began.

FREDERICK CRETORS,
Indianapolis, Ind.

(The case of someone resisting the influence of our magazines by an unwillingness to admit the education and entertainment value of such "strange" stories and then suddenly yielding to them, is a common one, we learn. We are all the more interested to hear that Mr. Cretors' father has become a "convert." We would like to hear from him to learn his reactions to the magazines and its stories.

The future of science fiction is as unlimited as that of science itself. AIR WONDER STORIES pioneering into the future of aviation as well as the other sciences aims to set itself up already as one of the apostles of the new order which must inevitably come. And because it is to be a socially beneficial order we want to hasten it.—*Editor.*)

An Associate Editor Speaks

Editor AIR WONDER STORIES:

I have received the July and August numbers of SCIENCE WONDER STORIES and AIR WONDER STORIES, and have read several of the stories with great interest. I am glad to note that you are going to include an "Aviation Forum" in AIR WONDER STORIES beginning with the September number, along with a department of "Aviation News of the Month."

In your answers to the questions of Mr. Benjamin Jenkins on page 188 of the August issue, you are partly in error in your answer to his second question. The sustaining force on the airplane is principally due to a partial vacuum on the top side of the wings. At high angles of attack about seventy-five per cent. of the "lift on the wings" is due to the vacuum on the top of the wings. In other words, there is never more than twenty-five per cent. of the "lift" due to a pressure on the bottom.

I desire to inform you that I have resigned my position as Associate Professor of Aeronautical Engineering at Purdue University in order to accept a position as Professor of Aeronautical Engineering at Iowa State College, Ames, Iowa.

WILLIAM A. BEVAN,
Major, Air Corps Res.,
Iowa State College, Ames, Iowa

(We are very glad to have this explanation from this eminent aeronautical authority, member of our board of associate editors, on the forces acting to lift a plane. We are happy to, to congratulate Professor Bevan on his change which, we note, carries with it a full professorship.—*Editor.*)

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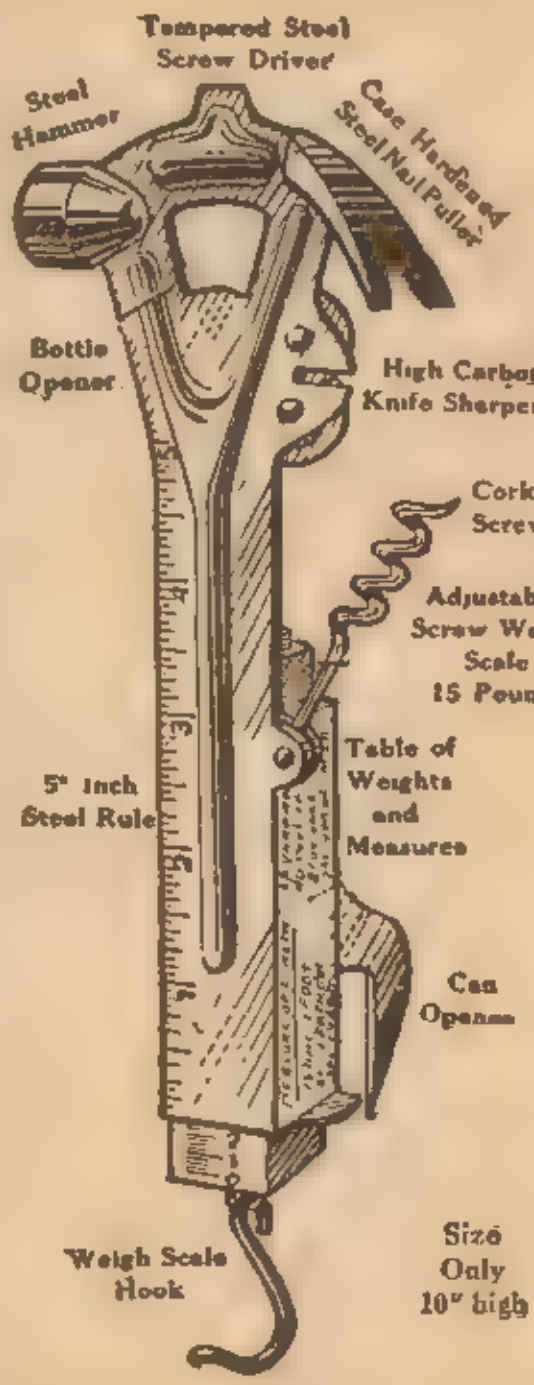

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AVIATION NEWS
(Continued on page 280)
AVIATORS

New Women's Altitude Record Made

A NEW women's altitude record was made by Miss Marvel Crosson, of San Diego, Cal., when she drove her cabin monoplane to 24,000 feet. The record was held by a Mrs Haden of Oakland, Cal., who had risen to 23,270 feet. The trip took altogether two hours. At the highest altitude the temperature was said to have fallen to 15 degrees below zero.

Flight Restores Girl's Voice

A FLIGHT in a plane at the Newark Airport has restored the voice of Margaret Wintermeyer who has been dumb for more than a year. The cure was suggested by Dr Frank Piercey, of the Rockefeller Institute, who advised a sudden dive in a plane. This was carried out and half an hour in the air gave Miss Wintermeyer the ability to speak in a rather halting way. She is going to continue the treatments.

Ships May Give Aviators Valuable Information

SHIPS that so wish may render valuable information to trans-oceanic flyers, declared Lieut. Knud Von Clauson-Kaas, of the Royal Danish Flying Corps, who plans a Newfoundland-Copenhagen flight this year. Ships may run up flags when a plane approaches, indicating a desire to render information. Then the ship can spread on its deck large sheets on which are figures, each one giving certain valuable information. One number will indicate the plane's latitude, another the longitude, a third the direction of the wind and a fourth the force of the wind in miles.

New Regulations for Transport Pilots

FROM a survey of the accidents on airplanes during 1928 resulting in the conclusion that the human equation is responsible for half the accidents, and 29 per cent of the rest be due to the poor technique of pilots, new and stricter regulations for transport pilots will be put into effect on September 1st.

This was the statement of Edward P. Howard, chief of the Air Regulations Division of the Department of Commerce. By transport pilots is meant those who pilot commercial planes or planes over a certain weight. The new regulations will allow transport pilots to fly only the type of planes they are licensed for. To fly any other, new examinations must be taken.

Three classes of planes will be listed. The first is those weighing not more than 3,500 pounds, the second include weights of 3,500 to 7,000 pounds and the third over 7,000 pounds.

All licenses will be revised after September 1st, and it is expected that safety in the air will be materially increased.

Development of Safety Aviation's Greatest Need

THE development of greater safety in aviation is the industry's greatest need, declared John K. Northrop, chief engineer Avion Corporation, as told to A. M. Rochlen in the New York *American*. Fog and fire are the two most deadly menaces which must be overcome. He believes that we are gradually eliminating these dangers.

The elimination of fire will come from the use of engines and fuels especially designed for that purpose. In this connection the Diesel engine is noted. Aside from its low operating cost it uses a non-explosive crude oil and has its power system so that fire is practically impossible. "Planes of to-morrow," he says, "will be powered by slim, rugged Diesels placed out of the way of 'parasitic drag' and head resistance."

The need for pilots to know their altitude above the ground rather than that above sea level has given rise to the development of new altitude meters, one of which has been developed by the General Electric Company. Such a meter is invaluable when the pilot flies in a fog. The radio beacons will help guide the pilot through fogs to a safe harbor but markers for with automatic stabilizers will keep him on his course.

Two-way telephone conversations already carried out between a plane 18,000 feet up and the ground promise well for keeping the pilot in touch with what is going on.

(Continued on page 285)

AVIATION NEWS (*Cont'd*) GENERAL

Company Assists Flying Club Formation

ENTHUSED by the reception that the "flying club" idea has been given by the country, the Swallow Airplane Company has engaged its research department on the task of forming clubs. A set of by laws for use by clubs have been drawn up and are available through the company. The clubs are to be known as the Swallow Flying Club of the city in which they are formed. The company is located in Wichita, Kansas. The idea of the club is to allow people who have not the time or money to go to an air center to learn flying, to do so at their own home cities at times convenient to wage earners.

Lure of Aviation Strong to Youth

FIGURES showing the number of applicants for pilot's licenses and student licenses indicate the lure of aviation to the youth of the country, said Jesse W. Lankford, chief of the Licensing Bureau of the Department of Commerce, according to a New York *Times* despatch. One of the great impulses toward aviation was given by Col. Lindbergh's Paris flight. The whole aviation industry has been given such an impetus, and the need for trained flyers has grown so that a pilot can easily command a salary of $5,000 a year to-day. At first most of the trained flyers came from the Army and Navy, but now the aviation schools are turning out thousands. Nearly 15,000 civilians hold student licenses issued by the Department of Commerce.

What is Safest Method of Travel

IN an attempt to discover just how safe the airplane is as a method of travel, the Washington *Star* has collected figures on accidents by trains, automobiles and airplanes for the year 1928. As a result of the operation of railroads, one person was killed for every 172,786 miles traveled. There was one fatality for every 191,500 miles traveled by plane, while the automobile accounted for only one death in 6,232,412 miles of travel. But the deaths do not indicate the full extent of the risk. Every fatality on trains carried with it 73 accidents not fatal, for every death by plane there were hardly two injuries, while accompanying every automobile death there were 30 persons injured. While the automobile apparently is safer than either of the other two, its margin of safety is not great, while the risk of travel by auto is increasing rapidly with the growing congestion.

Navy Aids Commercial Aviation Says Ingalls

FROM the experience of the World War and taking an enlightened view of the future, the Navy Department is doing all in its power to aid commercial aviation, said David S. Ingalls, Assistant Secretary of the Navy for Aeronautics. Since the armed forces of the country cannot be great enough, either in men or equipment for either an offensive or defensive war, there must exist some reserves which can be called upon. This was the text of one of the reasons why commercial aviation should be aided. The Navy Department is sharing with the air companies the improvements that it makes in planes and plane equipments. It is no longer competing with the commercial companies in any way. It offers advice, and maintains research divisions hoping that a great number of trained pilots and a number of planes, convertible to national uses, may be available.

Official Record for Altitude Awarded Neunhofen

OFFICIAL examination of the recording instruments carried in the Junkers W 33 monoplane piloted by Willi Neunhofen indicated that he broke the world altitude record, attaining a height of 41,795 feet or less than 500 feet short of eight miles.

During his trip Neunhofen passed through a temperature range of 156 degrees Fahrenheit, for it was 80 degrees above zero on the ground and 76 degrees below when he arrived at the extreme altitude. At the top of his climb he became unconscious from the cold and his machine went into a glide, descending almost four miles before he became conscious again. His safety was made possible by an automatic device attached to the steering wheel. As soon as his hands were taken from the steering wheel (the time when he slipped into unconsciousness) an oxygen flow was released and the motor was shut off thus provoking the glide.

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BOOK REVIEWS

SKYLARKING, by Bruce Gould, illustrated, 260 pages, stiff cloth covers, size 5¼x8, published by Horace Liveright, New York. Price $2.50.

Mr. Gould, who is Aviation Editor of the New York *Post* has been an enthusiast about aviation from its early beginnings. He therefore takes on with some grace the pose of apostle and exponent of the new art of aviation. For art it is, according to Mr. Gould. There is next to nothing in his book that smacks of the carrying of beef or cheese or dry goods. Aviation to him is principally a thrilling experience that the gods have put into the lap of man. And man using it to swing through the starry heights of night or straight into the blazing orb of the sun, laughs his defiance of those gods. Skylarking is therefore a symphony on the joy of flying. It is written with the author's sensitiveness strained to the utmost to catch all the fleeting shades of meaning that a trip through terrestrial space allows. Perhaps he overdoes his rejoicing, so that the reader feels finally a sensation of surfeit. But if that is true Mr. Gould probably errs on the side of too much enthusiasm rather than too little sincerity.

The book is not wholly taken up with the paean of joy at man's ability to fly. Several chapters are devoted to the history of flying and of the great flights of the last ten years. The records of the stalwarts of flying of each is analyzed with a striking impartiality. So although tribute is paid to Lindbergh for his spectacular flight to Paris in 1927 the author believes that Alcock and Brown, who flew the Atlantic from Newfoundland to Ireland in 1919 received too little credit.

LEARNING TO FLY, by Frank A. Swoffer, M.B.L., 136 pages, illustrated, size 4¼x7¼, stiff cloth covers, published by Isaac Pitman & Sons, New York. Price $2.25.

"Learning to Fly" is a detailed study of the actual mechanics of flying—the control of the machine. The author begins at the beginning by illustrating the simplest maneuvers of the plane—the use of the elevators, ailerons and rudder. Then taking the readers for a theoretical ride, the author indicates how the controls should be applied in each case, and the practical complexities that attend the use of the controls.

The author wishes to make an art, a practical art of the business of flying. Therefore each possible situation in taking off, maneuvering and landing receives his attention.

Interesting psychological is the method of illustrating a point by a picture in which the reader actually sees himself in the plane and behind the controls. This should help somewhat to give a student the feel of being the pilot of the plane.

This book should be very valuable to flying clubs, students receiving training and those who wish to know how little or how great the complexities of flying are.

ELEMENTS OF AVIATION, by Virginius Evans Clark, 185 pages, illustrated, stiff cloth covers, size 5¾x8¼, published by Ronald Press Company, New York. Price $3.00.

Colonel Clark, we understand, is an international authority on airplane design and construction having been the chief aeronautical engineer of the U. S. Army for five years. We must therefore grant him the qualifications to write authoritatively on the principles of aviation.

"Elements of Aviation" seems designed to provide basic understanding of the principles of flight. Through a study of the effect of air flow on the surfaces of a plane we learn the aerodynamic principles that operate the plane. For one who wishes really to fly too much can not be learned about the elusive and often temperamental factors that govern flight for being based on such a fluid and ever moving thing as air, flight requires a goodly knowledge of the physical laws that govern the air.

Particularly interesting is the chapter on the earth's atmosphere. Here the extent and quality of the atmosphere, the ceiling, etc., are considered and explained both from a mathematical and a general point of view. The possibilities of high speed at high altitudes now seriously engaging the attention of aeronautical experts, is considered.

The subjects in the book receive careful mathematical treatment and therefore it is of special interest to those who wish the qualitative as well as not merely the qualitative elements of the flight problem.

AVIATION FORUM

(Continued from page 275)

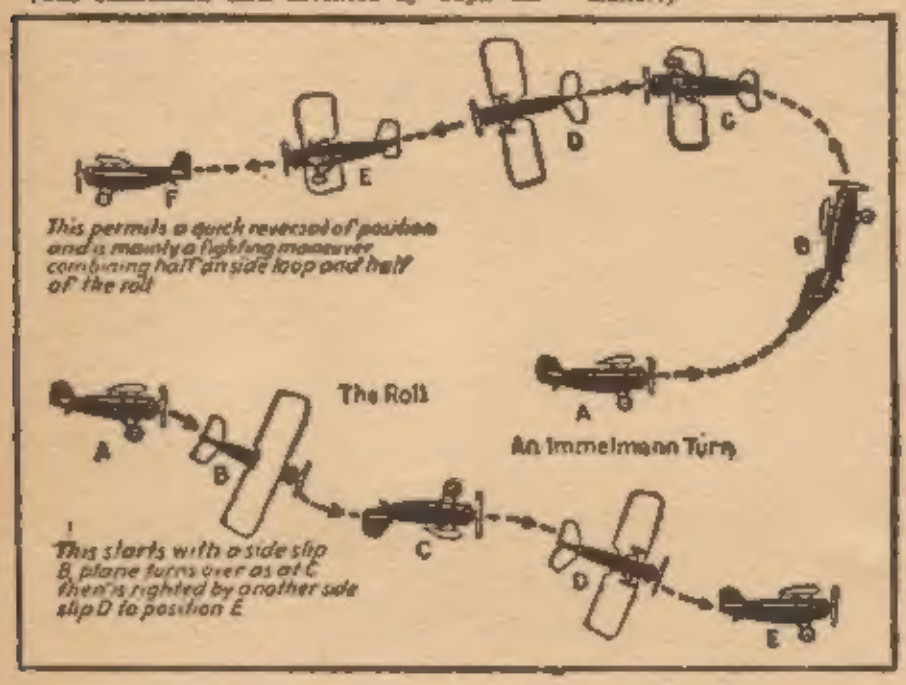
What is the Roll and Immelman Turn?

Editor, Aviation Forum:

Please accept my heartiest congratulations on the splendid two issues of AIR WONDER STORIES that I have seen thus far. They certainly do credit to your name and reputation. I am very much interested in this new department to be called "Aviation Forum" and I will be an eager and interested reader of it. As my share of the questions allowed I would like to know what the famous "Immelman turn" is, that writers on military aviation speak so much of. Also what is a "roll?"

FERD B. CATES,
Wilmington, Del.

(The Immelman turn invented by Capt. Immelman, one of the great German aces during the late war, is a combination of inside loop and a roll. The pilot pulls the stick fully back so that the elevator rises and turns the plane over on its back. At the same time he lowers the aileron on one side and raises it on the other so that the plane turns over on its side. The opposite is often found in diving when a diver will jump into the air, execute a half somersault and then before he reaches the water twist over on his side. The roll means simply what it implies, the turning of the plane over on its side by continuously raising one aileron and keeping the other depressed. The accompanying diagram illustrates these points.—*Editor.*)


This permits a quick reversal of position and is mainly a fighting maneuver combining half an side loop and half of the roll
The Roll
An Immelmann Turn
This starts with a side slip
B plane turns over as at C
then is righted by another side slip D to position E

Showing the "Roll" and the "Immelman Turn." Note the position of the plane at each position and the change in position of the plane. (From "A-B-C of Aviation" — Page.)

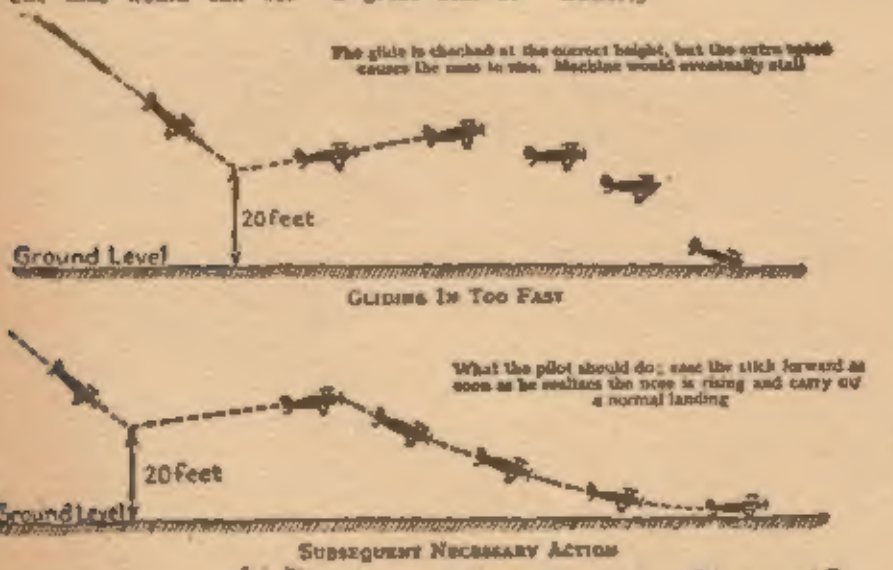
Correcting Too Steep Landing

Editor, Aviation Forum:

I have often heard it said that landing is one of the most difficult parts of piloting a plan. I have often wondered just what a pilot could do if he were gliding to earth at too steep an angle and when near the ground suddenly discovered his error. Could he save himself and his ship? I would appreciate an answer to this, especially in diagram form if you do find space for one.

DAVID L. BROWN,
Kansas City, Mo.

(Such a predicament as Mr. Brown describes is one that would call for a great deal of skill. If we assume that he comes out of the glide at say twenty feet from the ground the two diagrams shown would indicate what would happen in two contingencies. If after coming out of the glide the craft heads upward again and the pilot does not correct this he will find that the plane will stall on the upward climb and it will probably pancake to earth, as shown in the upper figure. If however he depresses the nose of the craft, after coming out of the glide, while he still has flying speed, he can continue the glide to earth at a smoother angle than before and make a safe landing.—*Editor.*)


The glide is checked at the correct height, but the extra speed causes the nose to rise. Machine would eventually stall
20 feet
Ground Level
Gliding In Too Fast
What the pilot should do; ease the stick forward as soon as he realizes the nose is rising and carry on a normal landing
20 feet
Ground Level
Subsequent Necessary Action

The wrong and right way to correct a glide which is at too steep an angle with the ground. (From "Learning to Fly" — Swopper.)

Who First Flew English Channel?

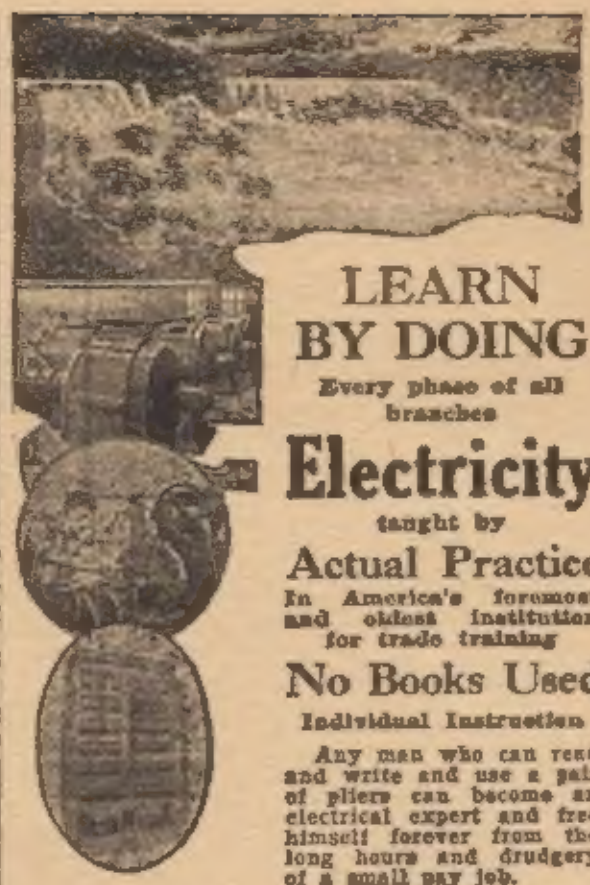
Editor, Aviation Forum:

Would you please tell me, if you can, who the first man was to fly the English channel. I have had a number of disputes about this point maintaining it was Bleriot, a Frenchman. Others claim it was Langley the American. What kind of a machine did the man have and what speed did he make?

I want to congratulate you while I am writing on AIR WONDER STORIES. I think it is a corking magazine and am sure it will be very successful. All my friends borrow my copy and read it and they surely like it. However I must get them to subscribe for their own for I mean to keep all my copies and we can't all keep one copy.

RUSSEL W. KENT,
Memphis, Tenn.

(The first man to fly the English channel was Louis Bleriot a Frenchman. So you were right in all but the spelling of his name. He used a monoplane of his own construction powered by a three-cylinder motorcycle engine having about 20 horsepower. He flew 21 miles, the distance between Calais and Dover in 23 minutes, a remarkably good speed for 1909, the time when he made the flight.—*Editor.*)



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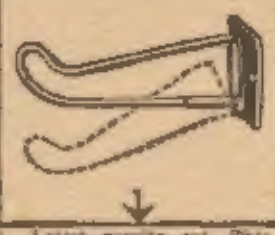
HOAX HANGER



Latest novelty out. This trick coat-hanger looks just like the regulation article. But try and hang a coat on it and—PLOP down it comes. Hanger has a spring hinge—open a hat pulls it down. Hanger is fastened to wall with nails or screws. Nickel plated.

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BLUFFGUN

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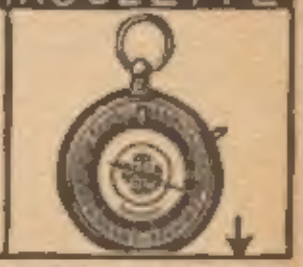

Real roulette game. Press lever and arrow spins around. Never stops twice on same number in succession. Same size as your watch. Fully nickel plated, glass crystal. Loads of fun. Has a ring to attach to your watch chain.

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By S. R. Winters

The Screened-Loop Antenna
By Baron Manfred Von Ardenne

Making Low-Loss Coils
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The Resonance-Wave Tuner
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Cone Pulleys Solve Television Synchronizing
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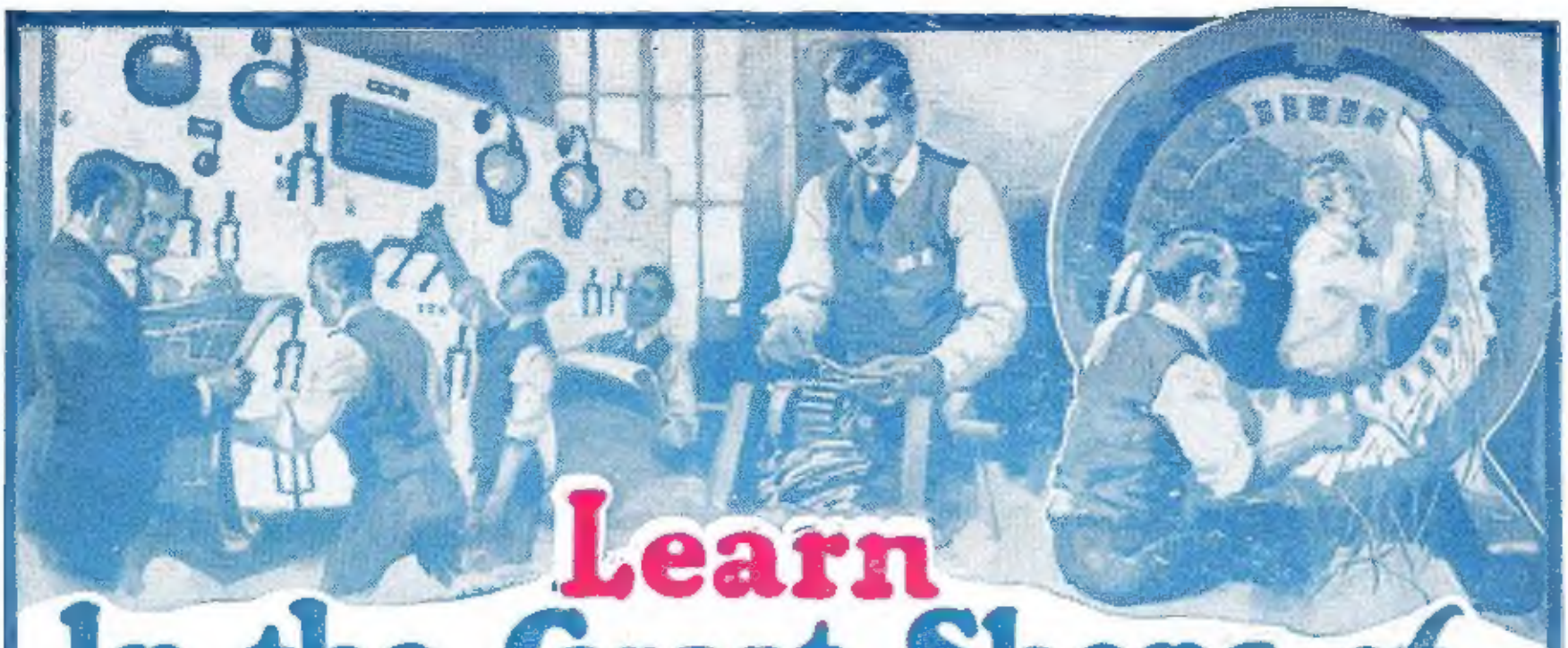

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